

Figure 1-1. Model 7044B X-Y Recorder

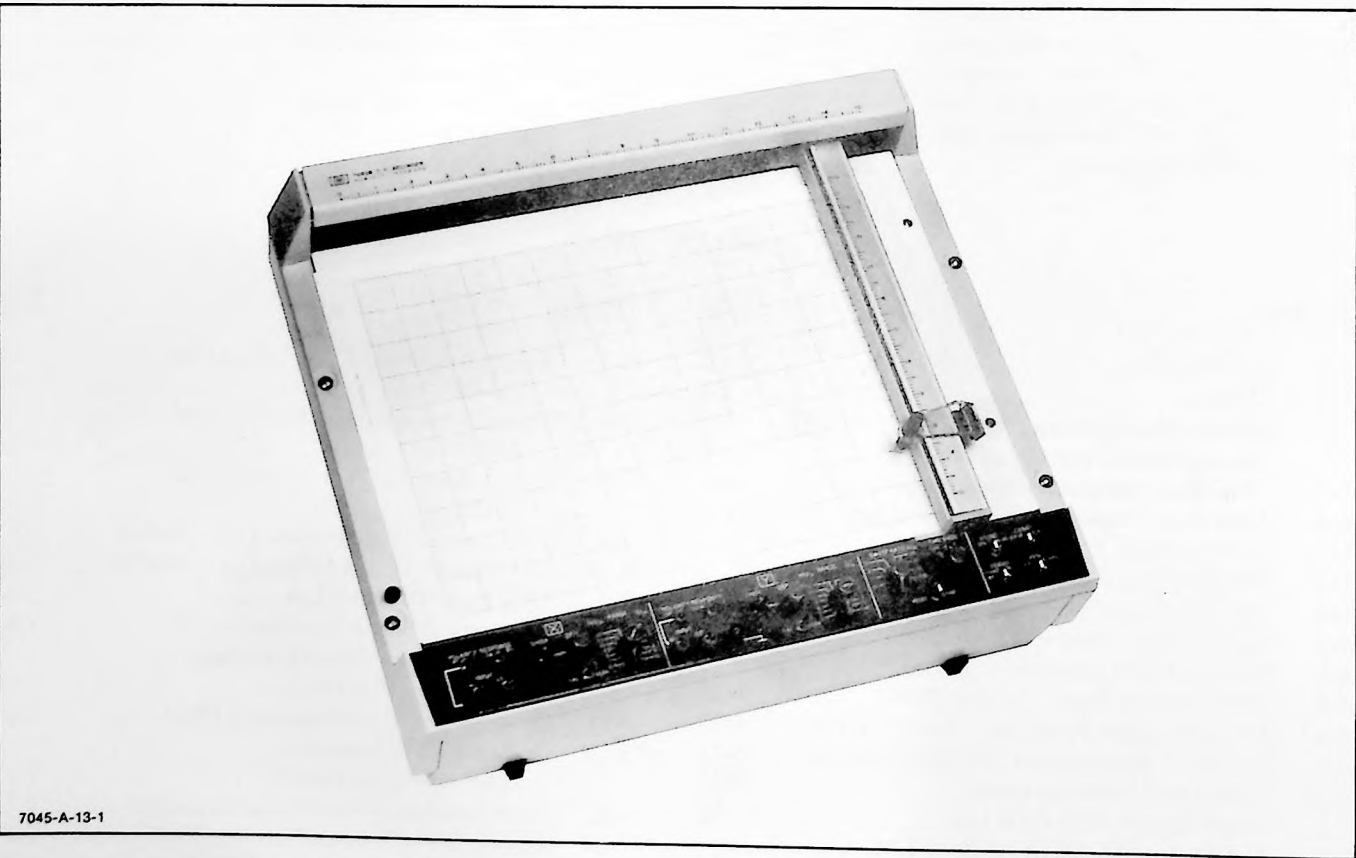


Figure 1-2. Model 7045B X-Y Recorder

SECTION I

INTRODUCTION

1.1 DESCRIPTION.

1-2. BASIC FRAME.

1-3. The Hewlett-Packard Models 7044B and 7045B X-Y Recorders are designed for the laboratory user to plot cartesian coordinate graphs from dc electrical information. The 7044B or 7045B will satisfy the needs of the user seeking reliability and dependability. The 7045B recorder features high speed capability and rapid acceleration to accurately record high-frequency and fast-moving input signals. It also offers a RESPONSE switch which allows the user the choice of a fast or slow response. Both models are equipped with the newly designed, continuous duty, aluminum framed dc servo motor; the X-axis of the 7045B contains the larger, faster motor. This design concept ends overheating or wear if the pen is driven offscale for an indefinite time. Other features found on the 7044B and 7045B include 14 calibrated dc input ranges in each axis from 0.5 mV/in. (0.25 mV/cm) to 10 V/in. (5 V/cm), TTL Remote Control, and a Rear Connector. Arbitrary full scale voltage ranges may be established with a variable input vernier in conjunction with the calibrated dc ranges. A trouble-free electrostatic hold-down platen capable of holding chart paper up to 11 x 17 inches and the standard European A3 size, a disposable pen with four color choices, and plastic coated wirewound balance potentiometer are also provided on both models. Latest circuitry design and assembly techniques have also been incorporated into both models, thereby reducing failure and maintenance time. Additionally, both recorders can be equipped with such options as Time Base, Event Marker, or Metric Scaling. See Figures 1-1 and 1-2 depicting the standard 7044B and 7045B models.

1-4. MODEL – MANUAL INFORMATION.

1-5. The contents of this manual apply to recorders with the serial number prefix(es) listed under SERIAL NUMBERS on the title page. The serial prefix is the first four digits and a letter of a two-part, ten-item serial number (0000A-00000) used to identify each Hewlett-Packard instrument (see Figure 1-3). Should any change to this manual be necessary, a new serial prefix will be assigned to the changed model and a change sheet (Manual Change) will be supplied defining the differences between the changed model and the one described within this manual. Other corrections due to any errors that existed when this manual was printed will be provided. This type of change, called Errata, also appears on the change sheet (Manual Change). For additional information pertaining to these recorders, or other

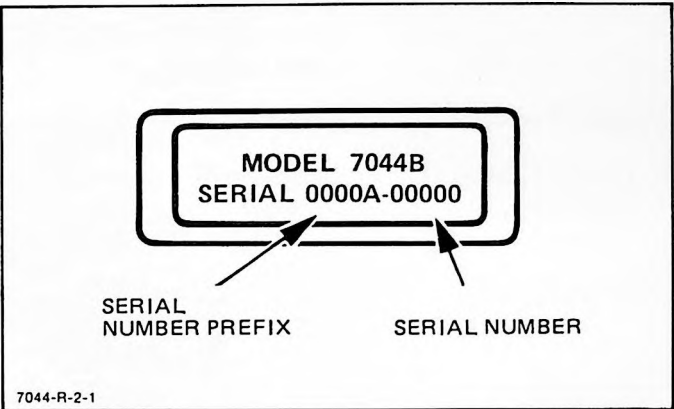


Figure 1-3. Instrument Identification

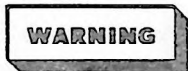
Hewlett-Packard instruments, contact the nearest Hewlett-Packard Sales/Service Office.

1-6. SPECIFICATIONS.

1-7. Table 1-1 lists the specifications and accessories supplied or available with the 7044B and 7045B models. Figure 1-4 illustrates the outside dimensions. Option specifications are also defined in this section.

1-8. SAFETY SYMBOLS.

1-9. The following safety symbols are used with this Operating and Service Manual.



The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.



The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the equipment. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.



OPERATING AND SERVICE MANUAL

7044B/7045B X-Y RECORDER

SERIAL NUMBERS

This manual applies directly to recorders with serial numbers prefixed 2047A.

For additional important information about serial numbers, see Recorders Covered by Manual in Section I.

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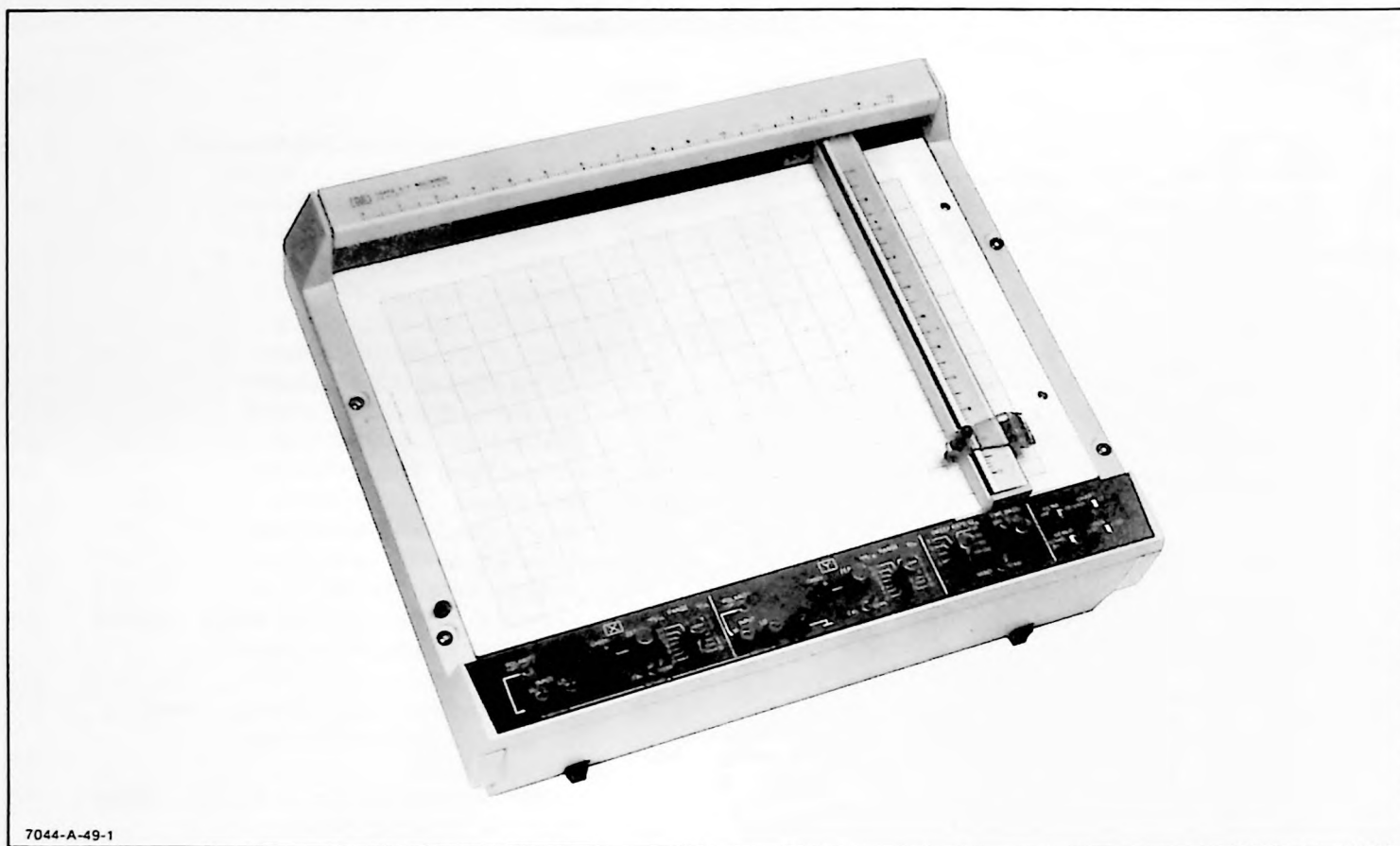


Figure 1-1. Model 7044B X-Y Recorder

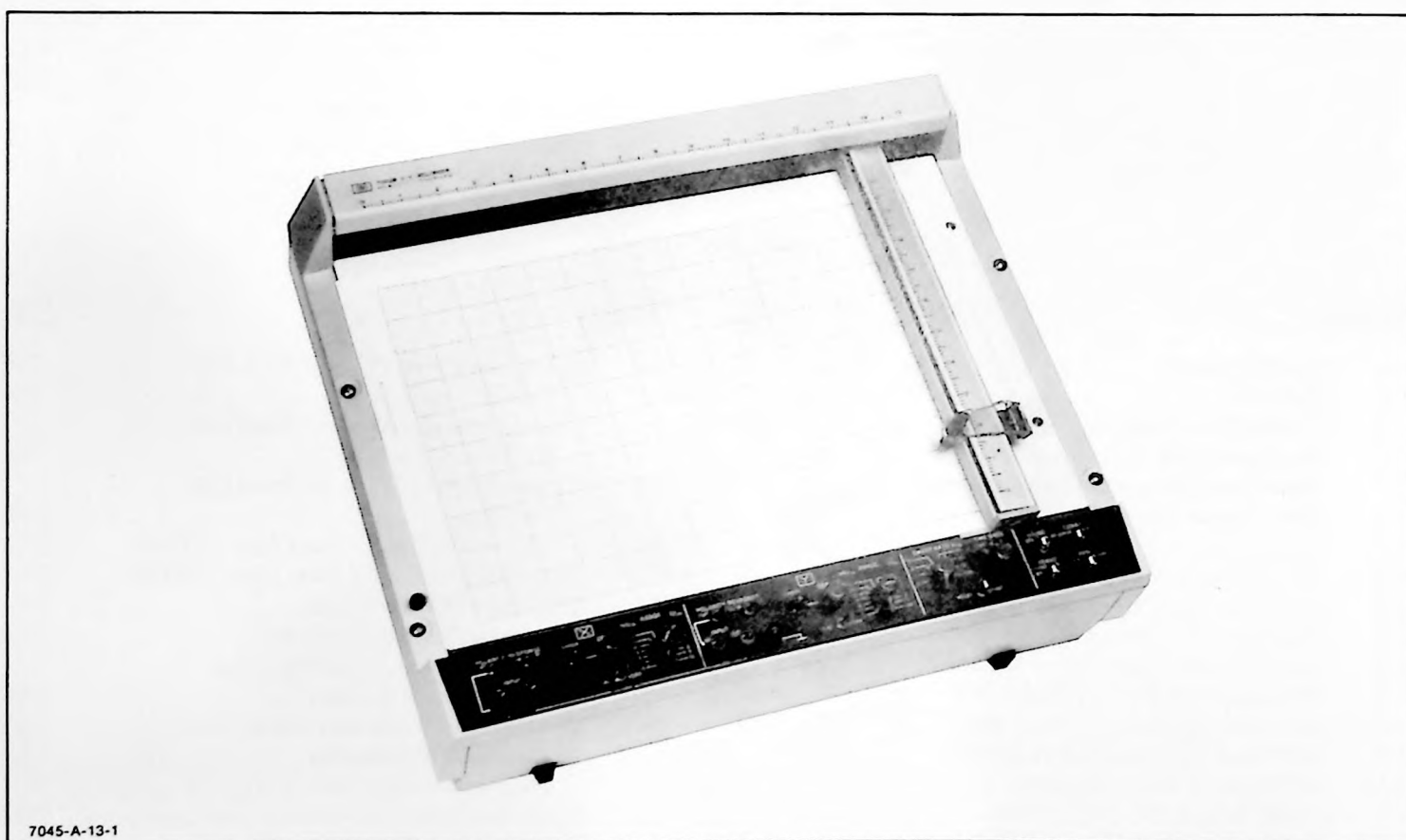


Figure 1-2. Model 7045B X-Y Recorder

SECTION I

INTRODUCTION

1.1 DESCRIPTION.

1-2. BASIC FRAME.

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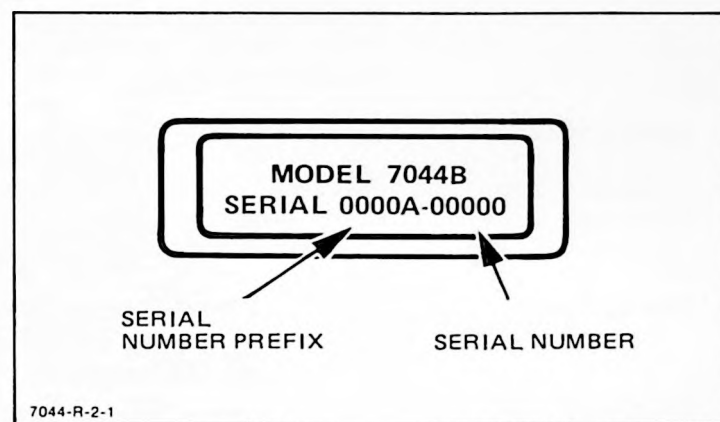


Figure 1-3. Instrument Identification

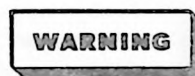
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1-8. SAFETY SYMBOLS.

1-9. The following safety symbols are used with this Operating and Service Manual.



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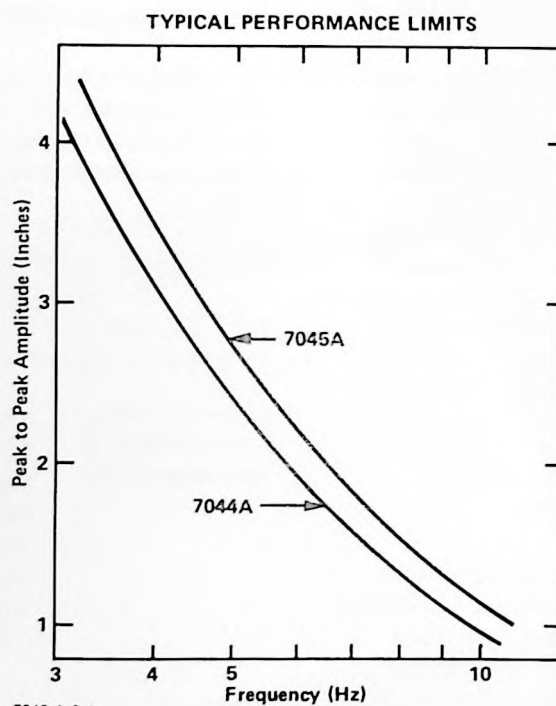


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TABLE 1-1. SPECIFICATIONS

PERFORMANCE SPECIFICATIONS.

Input Ranges:	0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500 mV/in., 1, 2, 5, 10 V/in. (metric capability available in 0.25, 0.5, 1, 2.5, 5, 10, 25, 50, 100, 250, 500 mV/cm, 1, 2.5 5 V/cm). Continuous vernier between ranges.
Type of Input:	Floating 30 Vdc or peak ac maximum. Polarity reversal switch located on front panel, guard internally connected. Inputs through front panel 5-way binding posts or optional rear connector. Pen lift control is also available through rear-mounted banana jack connectors, or a 37-pin rear connector.
Input Resistance:	1 megohm constant on all ranges.
Common Mode: Rejection	110 dB dc and 90 dB ac at 50 Hz and above with 1 K ohm between HI and LO terminals. CMR voltage applied between ground and LO, and attenuator on most sensitive range. On other ranges CMR decreases 20 dB per decade step in attenuation.
Slewing Speed:	7044B — 20 in/sec (50 cm/sec) minimum 7045B — (Fast Response) 30 in/sec (76 cm/sec) minimum; (Slow Response) 15 in/sec (36 cm/sec) typical.
Acceleration:	7044B — Y-axis, 1000 in/sec ² . (2540 cm/sec ² .) X-axis, 500 in/sec ² . (1270 cm/sec ² .) 7045B — (Fast Response) Y-axis 3000 in/sec ² . (7620 cm/sec ² .) X-axis 2000 in/sec ² . (5080 cm/sec ² .) (Slow Response) Y-axis 2500 in/sec ² . (6350 cm/sec ² .) X-axis 1500 in/sec ² . (3800 cm/sec ² .)



Accuracy:	±0.2% of full scale (includes linearity and deadband) at 25°C. Temperature Coefficient ±0.01% per °C.
Range Accuracy:	±0.2% of full scale ±0.2% deflection (includes linearity and deadband) at 25°C. Temperature Coefficient ±0.01% per °C.
Deadband:	0.1% of full scale.

TABLE 1-1. SPECIFICATIONS (Continued)

Overshoot:	7044B — 2% of full scale (maximum). 7045B — 1% of full scale (maximum).
Zero Offset:	Zero may be placed anywhere on writing area or electrically off scale up to one full scale from zero index.
Relative Humidity:	5% to 95% (below 40°C).
TTL REMOTE CONTROL.	
Operating Levels:	Contact closure (0.2 mA) to ground or TTL levels. Logic (0): Between -0.5 Vdc and +0.4 Vdc. Logic (1): Between +2.4 Vdc and 5.5 Vdc.
REAR CONNECTOR.	
Connects Event Marker and TTL. Provides X and Y inputs and pen lift TTL controls. Supplies START and RESET remote capability. TTL and Rear Connector provide Electrostatic Holddown and Servo Standby capability on Model 7044B. Additionally, X and Y Response on Model 7045B.	
REMOTE PEN LIFT.	
Banana Jacks provide remote control of pen lift.	
GENERAL SPECIFICATIONS.	
Writing Mechanism:	Servo actuated ink pen.
Writing Area:	10 in. x 15 in. (25 cm x 38 cm).
Paper Holddown:	Electrostatic paper holddown grips charts 11 in. x 16.5 in. and standard European size A3 (29,7 cm x 42 cm) or smaller. Special paper not required.
Pen Lift:	Electric (Remote, via contact closure or TTL level).
Power:	100, 120, 220, or 240 volts ac +5 -10%, 48 to 440 Hz; 7044B, 135 VA; 7045B, 175 VA
Weight:	7044B: Net, 30 lb (13,7 kg); shipping 42 lb (19,1 kg). 7045B: Net, 30 lb (13,7 kg); shipping 44 lb (20 kg).

1-10. OPTIONS.

1-11. Optional features available for the two models are specified in Table 1-2. The following paragraphs describe these features which may be built into or combined with these recorders. Table 1-3 contains the specifications of the options.

1-12. TIME BASE — OPTION 001.

1-13. Eight speeds from 0.5 sec/in. to 100 sec/in. are available for both models in either the X or Y-axis. In the 7045B model, however, with the addition of the RESPONSE switch, the selection of the X or Y-axis time base sweep

speed automatically results in the SLOW response of that selected axis; the other axis is not affected and operates normally. (May be ordered only at time of recorder purchase.) See Figure 1-5.

1-14. EVENT MARKER — ELECTRIC — OPTION 002.

1-15. A remotely controlled event marker, installed at the top of the Y arm, identifies significant events in a recording sequence by making an upward deflection in the margin at the top of the chart paper. See Figure 1-6. The cartridge-type pen is actuated by a remote contact closure. This option may be field installed.

1-16. METRIC SCALING – OPTION 006.

1-17. Metrically scaled and calibrated version of either recorder is provided. (May be ordered only at time of recorder purchase.)

1-18. ACCESSORIES.

1-19. Included in the standard Accessory Kit are a package of red and blue disposable pens, slidewire cleaner, and a mating connector. Additional accessories are added when certain options are added.

TABLE 1-2. OPTIONS

OPTION	DESCRIPTION
001	Time Base X or Y
002	Event Marker (Electric)
006	Metric

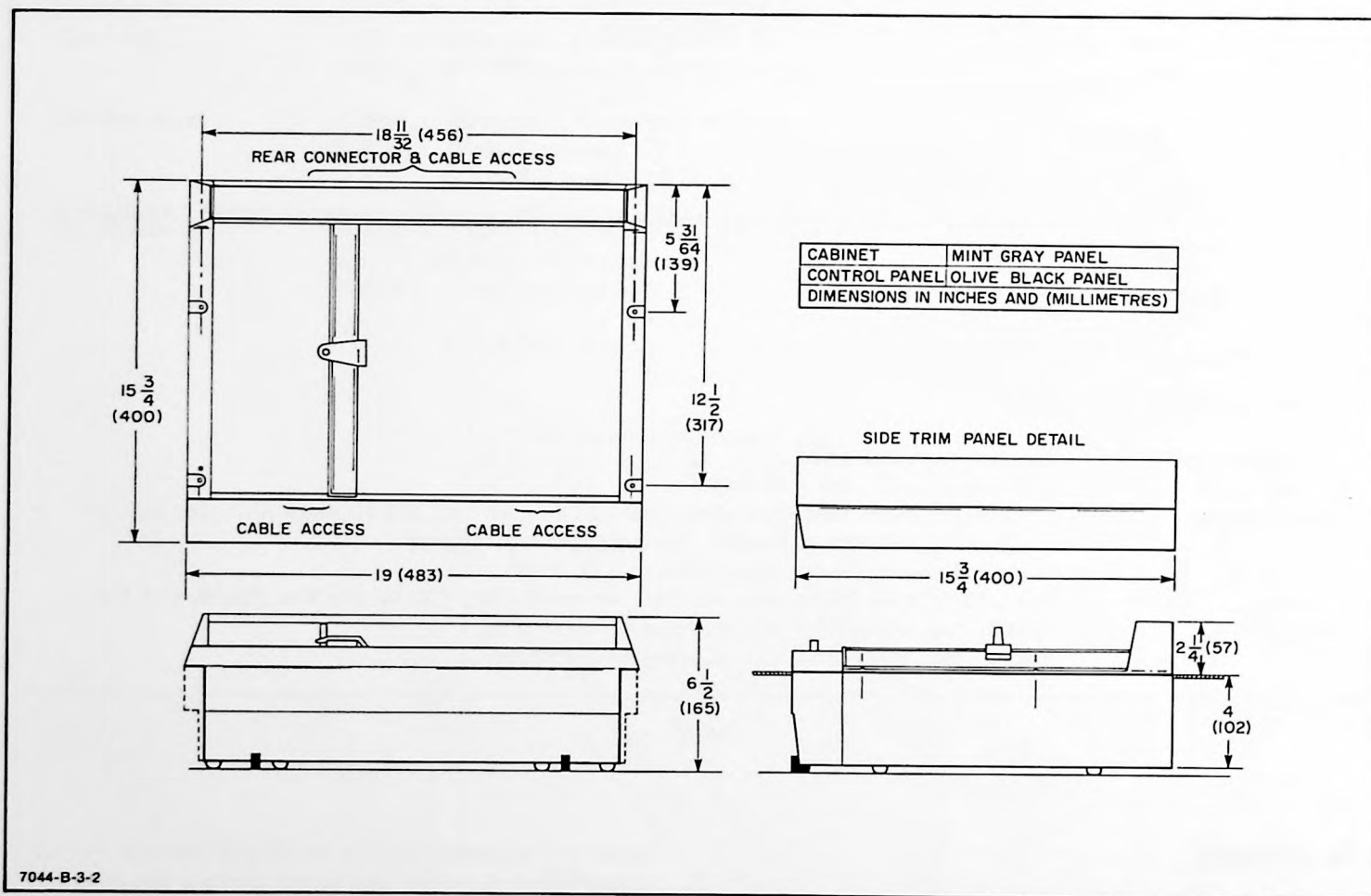


Figure 1-4. Model 7044B / 7045B Dimension Drawing

TABLE 1-3. OPTION SPECIFICATIONS

TIME BASE – OPTION 001

Sweep Rates: Eight selectable rates: 0.25, 0.5, 1, 2, 5, 10, 25, 50 sec/cm (0.5, 1, 2, 5, 10, 20, 50, 100 sec/in) X or Y axis. TTL sweep indication is provided.

Accuracy: $\pm 1\%$ full scale at 25°C ($\pm 0.1\%$ $^{\circ}\text{C}$ maximum).

Linearity: $\pm 0.5\%$ full scale at 25°C (to 0.04% / $^{\circ}\text{C}$ maximum).

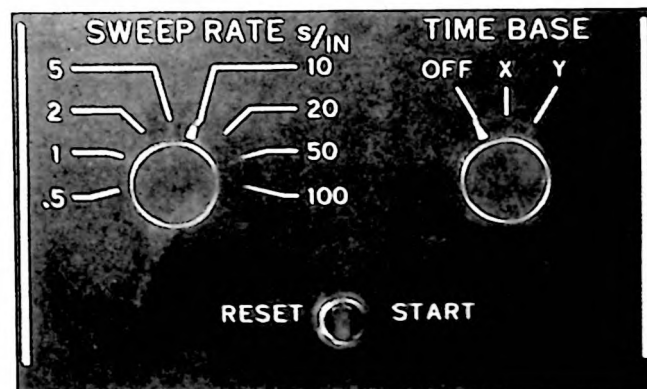
EVENT MARKER – ELECTRIC – OPTION 002

Marking Area: Upper margin aligned with X-axis position.

Excursion: Approximately 0.05 inch.

Ink Capacity: 0.45 cm^3 cartridge, writing distance 500 ft minimum.

Control: Remotely by contact closure to ground or TTL logic control.



7044-A-4-2

Figure 1-5. Time Base – Option 001



7044-A-5-1

Figure 1-6. Event Marker – Option 002



SECTION II

INSPECTION AND INSTALLATION

2-1. INTRODUCTION.

2-2. This section provides information for incoming inspection, installation, storage, and shipping of the 7044B and 7045B X-Y Recorders. Also included is the information required to field install and/or modify options for the two models.

2-3. INCOMING INSPECTION.

2-4. MECHANICAL CHECKS.

2-5. Inspect the recorder for mechanical damage, scratches, dents, or other defects. Also check the cushioning materials for signs of severe stress.

2-6. ELECTRICAL CHECKS.

2-7. The electrical performance of the recorder should be verified upon receipt. Performance checks, suitable for incoming inspection as well, are presented in Section V.

2-8. DAMAGE CLAIMS.

2-9. If the recorder is damaged in transit, or fails to meet specifications upon receipt, notify the carrier and the nearest Hewlett-Packard office immediately. A list of field offices is conveniently located in the back of this manual. Retain the shipping carton and padding material for the carrier's inspection. The field office will arrange for replacement or repair of your recorder without waiting for claim settlement against the carrier.

2-10. STORAGE.

2-11. When the recorder is to be stored for a period of time, the disposable pen and the event marker cartridge (if Option 002 is installed) should be removed and the upper part of the carriage arm clamped to the right side of the recorder to prevent damage during handling. Flush event marker ink lines out with water. Seal the recorder in moisture-proof covering with desiccant and repackage in a container similar to the original factory carton.

2-12. SHIPPING.

2-13. Before returning the recorder for any reason, notify the local field sales office of the difficulty encountered giving the model and serial number of the recorder. They will furnish shipping instructions. The following

precautions should be taken when repackaging the recorder:

- a. Remove disposable pen and event marker assembly (Option 002 if installed).
- b. Clamp the upper end of carriage arm and pen carriage to the right side of recorder with shipping clamp (HP Part No. 07040-60921) to prevent movement while in transit.
- c. Wrap recorder in heavy paper or plastic and surround with three to four inches of shock-absorbing material to cushion and prevent movement inside shipping container. Container should be sufficiently durable to prevent damage to recorder during handling. If in doubt, request a shipping carton from the nearest Hewlett-Packard Sales/Service Office.

2-14. RECORDER INSTALLATION.

2-15. MECHANICAL INSTALLATION.

2-16. The recorder is equipped with built-in rack mounting brackets for placing in a standard 19-inch cabinet. Four screws (two on each side) are used for easy installation. Feet and side trim panels are provided for bench type operation. Remove side trim panels before rack mounting. See Figure 2-1.



Figure 2-1. Side Trim Panel Removal

2-17. COOLING.

2-18. Cooling is provided by convection. The location of mounting of the recorder must ensure adequate air circulation.

2-19. OPTION INSTALLATION/CONVERSION.

2-20. These two models may be equipped with options which can increase the versatility and application to special

operating requirements. The following paragraphs describe those options that can be installed in the field.

2-21. EVENT MARKER — OPTION 002.

2-22. Installation is accomplished for either model per the instructions accompanying Event Marker Kit, Part Number 07044-60001.

SECTION III

OPERATING INSTRUCTIONS

3-1. OPERATING REQUIREMENTS.

3-2. INTRODUCTION.

3-3. The basic function of the Models 7044B and 7045B X-Y Recorders is to produce a cartesian coordinate graph showing the relationship between two variable functions. Slowly varying dc signals representing these functions are applied to the input terminals of the respective X and Y axis of the recorder and its controls adjusted so that the resulting graph will cover the desired region of the graph.

CAUTION

Before attempting to operate the recorder, the user should become familiar with the input requirements and various control functions as outlined in the following paragraphs.

3-4. CONTROLS, CONNECTORS, AND INDICATORS.

3-5. The front and rear panel controls, connectors and indicators are depicted and explained in Figures 3-1 and 3-3. The 37-pin rear connector is depicted in Figure 3-4.

3-6. ELECTRICAL REQUIREMENTS.

3-7. OPERATING POWER.

3-8. The ac power supplied to the models should be either 100, 120, 220 or 240 Vac, 48 to 440 Hz, single phase. Two voltage selector switches located on the underside of the recorder on the connector panel must be set to correspond to the available supply voltage. A 1.5-ampere time delay fuse is used for 100 or 120V operation and a 3/4-ampere time delay for 220 or 240V.

3-9. Power plugs used in the United States and other countries are shown in Figure 3-2. The plug rating and the HP Part Number for the plug and power cord are shown beside each plug. If the correct power cable is not available, notify the nearest Hewlett-Packard Sales and Service Office and a replacement cable will be provided.

3-10. INPUT SIGNALS.

3-11. The recorder's input terminals (HI and LO), located on the front panel, must be supplied with varying dc signals. These signals should vary at a rate within the response capabilities of the recorder and have amplitudes within their

scale ranges or an erroneous recording may result. It is possible to have an excessive amount of ac noise present in the input signals, thereby resulting in recorder response becoming oscillatory and inaccurate. It is important that the side of the signal with the lowest impedance to ground side is connected to the LO input terminal of the recorder. If this results in the recorder axis moving in the wrong direction, reset POLARITY switch to +RT or -RT for X-axis or to +UP or -UP for the Y-axis. If excessive normal mode noise is present on the input signals, an external filter(s) may be necessary.

3-12. GROUNDING.

3-13. For optimum performance, the center prong of the ac power cord must be grounded. When operating from ungrounded power sources, a secondary grounding method is mandatory.

3-14. OPERATING PRECAUTIONS.

3-15. SERVO.

3-16. To avoid unnecessary wear on the balance potentiometers and other mechanical parts, place the SERVO toggle switch in STANDBY when not recording.

3-17. If the input voltage exceeds the range setting, the pen will move quickly to one end of its travel and strike the drive mechanism stop. The motor will stop, protecting the recorder against damage until the input signal returns to an onscale value.

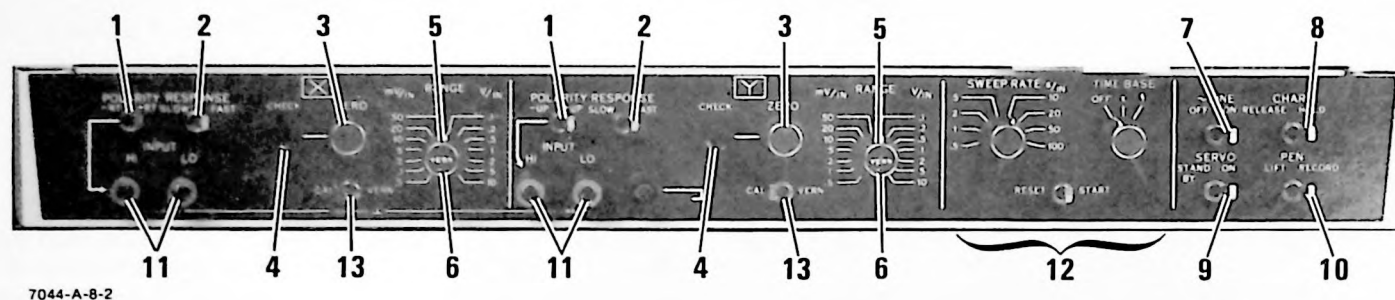
3-18. RESPONSE SWITCH.

3-19. On the 7045B, position RESPONSE toggle switch in SLOW position. This permits making prerecording span and zero adjustments without the pen and arm driving against the stops at full slewing speed. This position also enables the user to record slow input signals or reduce the speed of the recorder.

3-20. OPERATING INSTRUCTIONS.

3-21. CONNECT POWER.

3-22. Set the power voltage selector switch, located on the underside of the recorder, to either 100, 120, 220, or 240V +5-10% depending on the available power source. Connect the power cord between the power receptacle and the power source.

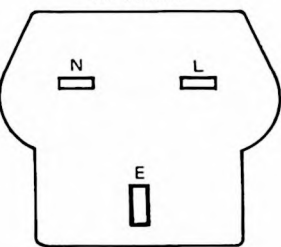
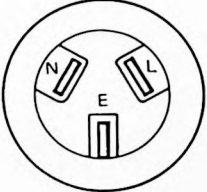
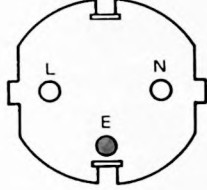
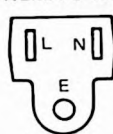
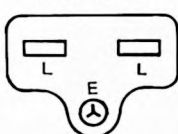

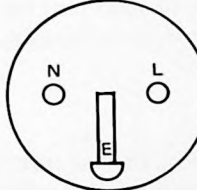


1. POLARITY SWITCHES (-RT +RT, -UP, +UP). Two toggle switches; one for the X-axis and the other for the Y-axis; provide polarity reversal.
2. RESPONSE SWITCH (7045B ONLY). A two-position toggle switch labeled SLOW and FAST. Use SLOW position for making prerecording adjustments, and also, if desired, record slow incoming signals or reduce speed of instrument.
3. ZERO CONTROLS. A control in each axis for adjusting the pen's zero position on the chart.
4. ZERO CHECK SWITCHES. A pushbutton switch to verify the zero setting of either the X or Y axis. When actuated, the input signal is disconnected and the pen returns to its zero position.
5. RANGE SWITCHES. A selector switch for each axis allowing the selection of 14 calibrated positions.
6. VERNIER CONTROL. A vernier control in each axis for multiplication of input range setting; overlaps two adjacent calibrated ranges.
7. LINE SWITCH. A two-position toggle switch; OFF and ON; that controls the application of the ac line voltage to the recorder.
8. CHART SWITCH. A two-position toggle switch; RELEASE and HOLD; that controls the chart holding function of the Autogrip table.
9. SERVO SWITCH. A two-position toggle switch; STANDBY and ON; that controls servo actuation for both axes.
10. PEN SWITCH. A two-position toggle switch; LIFT and RECORD; that controls the lowering and raising of the pen.
11. INPUT TERMINALS. Two input terminals are available for each axis. They are labeled HI and LO and will accept either open wire or banana plug connectors.
12. TIME BASE – OPTION 001. One control knob for the selection of eight sweep speeds in either axis. To determine the axis, place toggle switch from OFF to X or Y, then select sweep using sweep rate knob. RESET/START toggle switch stops sweep cycle, lifts pen, and resets pen to original starting position when placed in RESET; in START position, drops pen, sweeps pen across chart at selected rate.
13. VERNIER SWITCH: A selector switch for each axis which allows the vernier control to be switched ON or OFF.

CAUTION

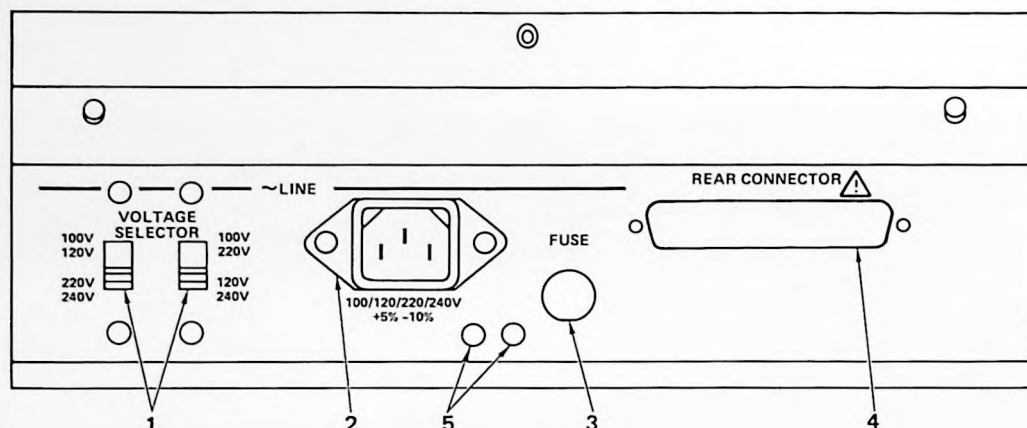
Disconnect input signal from axis, which has been placed in Time Base Mode, before starting sweep cycle.

Figure 3-1. Control Panel – 7044B and 7045B

		Option Number
<p>BS 1363 A</p> 	<p>HP Part Number 8120-1351; 250V, 13A, 1ϕ plug rating. (For use in United Kingdom, Cyprus, Nigeria, Rhodesia, Singapore)</p>	900
<p>AS C112</p> 	<p>HP Part Number 8120-1369; 250V, 10A, 1ϕ plug rating. (For use in Australia, New Zealand)</p>	901
<p>CEE 7-VII</p> 	<p>HP Part Number 8120-2857; 250V, 10/16A, 1ϕ plug rating. (For use in East and West Europe, Saudi Arabia, Egypt)</p>	902
<p>NEMA 5-15P</p> 	<p>HP Part Number 8120-1378; 125V, 15A, 1ϕ plug rating. (UL approved; for use in United States, Canada, Japan, Mexico, Philippines, Taiwan)</p>	903
<p>NEMA 6-15P</p> 	<p>HP Part Number 8120-0698; 250V, 15A, 1ϕ plug rating. (UL approved; for use in United States)</p>	904
<p>SEV 1011</p> 	<p>HP Part Number 8120-2104; 250V, 10A, 1ϕ plug rating. (For use in Switzerland)</p>	906
<p>DHCK-107</p> 	<p>HP Part Number 8120-2956; 250V, 10A, 1ϕ plug rating. (For use in Denmark)</p>	912
<p>NOTE: All plugs are viewed from connector end.</p> <ul style="list-style-type: none"> • L = Line or Active Conductor (also called "live" or "hot") • N = Neutral or Identified Conductor • E = Earth or Safety Ground 		

1-A-18-1

Figure 3-2. Power Cord Configurations



1. **VOLTAGE SELECTOR SWITCHES:** These two switches are positioned to correspond with the AC line input voltage. Any voltage of 100, 120, 220, or 240 volts AC.
2. **POWER CORD RECEPTACLE:** Use the power cord provided with the recorder.
3. **FUSE HOLDER:** For line fuse:

7045B:	100 or 120 volts 220 or 240 volts	1.5 AT (P/N 2110-0304) 750 mAT (P/N 2110-0360)
7044B:	100 or 120 volts 220 or 240 volts	1 AT (P/N 2110-0007) 500 mAT (P/N 2110-0202)
4. **REAR CONNECTOR:** A 37-pin connector for the input of all signals except power. A mating connector is supplied in the accessory kit.
5. **PEN LIFT (TTL):** Banana jack connector for remote control of the pen lift and 100 millisecond servo delay.

7044-A-9-2

Figure 3-3. Rear Panel

3-23. ENERGIZE RECORDER.

3-24. Place the LINE toggle switch to the ON position. This will furnish power to the recorder.

3-25. INSTALL PAPER.

3-26. Place chart paper on the recording platen and align the left edge with the paper stop. To energize the platen, place CHART toggle switch to HOLD.

3-27. INSTALL PEN.

3-28. The disposable pen is pushed into the notched holder located on the scale, and twisted clockwise to lock in holder.

CAUTION

The disposable pen incorporates a precision writing tip. Care must be taken not to damage this tip during pen changing or other handling. Writing by hand on any surface may damage pen tip. Use pen in pen holder on recorder.

3-29. SET VERNIER CONTROL.

3-30. Vernier control enables operator to adjust recorder sensitivity to any value between fixed ranges. It is often used to adjust the recorder sensitivity to align with actual function to be measured — not necessarily voltage (i.e. 100 lbs/in., 20 dB/in.).

3-31. CONNECT INPUTS.

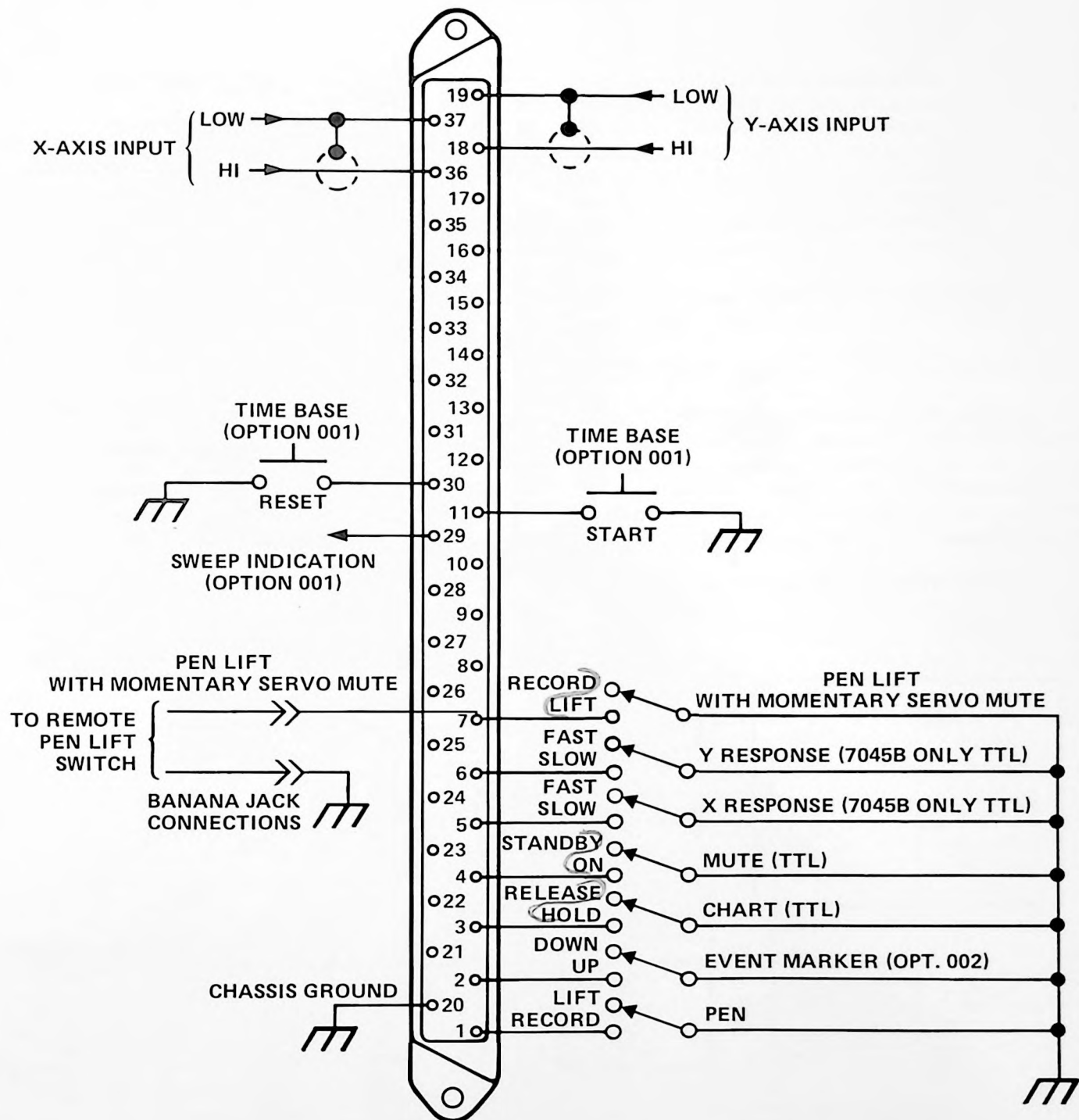
3-32. Connect the signal inputs to each axis through the front input terminals using open wires or banana connectors.

3-33. ZERO SET.

3-34. Connect the input signals to the recorder and adjust the zero position so that the resulting graph will cover the desired area on the paper.

3-35. LOWER PEN.

3-36. Lowering the pen for recording purposes is accomplished by positioning the PEN toggle switch to RECORD. When TTL is installed, pen lowering is energized by level changes to less than +0.4 Vdc. Changing level to between +2.4 and +5.5 volts will raise the pen.



7044-A-10-2

Figure 3-4. Rear Connector



SECTION IV

THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section contains the theory of operation for the Models 7044B and 7045B X-Y Recorders. As the circuits in the X and the Y axes for both models are similar, only the circuit theory for the Model 7044B Y-axis Amplifier is described in detail. The circuits that are unique to each model are described next. In addition, the theory of operation for the Time BASE CIRCUITS (Option 001) is explained. Refer to the simplified block diagrams of the standard recorders presented in Figures 4-1 and 4-2 and the appropriate schematic diagrams in Section VII.

4-3. CIRCUIT DESCRIPTION
7044B Y-AXIS AMPLIFIER.

4-4. INPUT ATTENUATOR ASSEMBLY.

4-5. The Attenuator assembly consists of two resistor networks, R1 through R6 and R7 through R11, which are mounted on switch S2A and S2B respectively.

4-6. Input signals for the seven mV/in (mV/cm) ranges are directly coupled, without attenuation, through resistor R7 to the Preamplifier stage. Resistor R7 performs as a current limiting resistor for these ranges. Resistors R8, R9 and R10 perform a similar current limiting function for the seven V/in (V/cm) ranges and in conjunction with R11 they provide attenuation for the input signals in three steps: divide by 10, divide by 100 and divide by 1000.

4-7. The second resistor network R1 through R6 sets the proper gain of the Preamplifier stage for each range.

4-8. PREAMPLIFIER.

4-9. The Preamplifier circuit is a DC amplifier which includes transistor Q1, Integrated Circuit (IC) U1 and their associated components. Diodes CR1 and CR2 provide input protection by limiting the differential input across transistor Q1. Input Filter resistor R1 and capacitor C1 present a low impedance (≈ 1 K) for frequencies above the

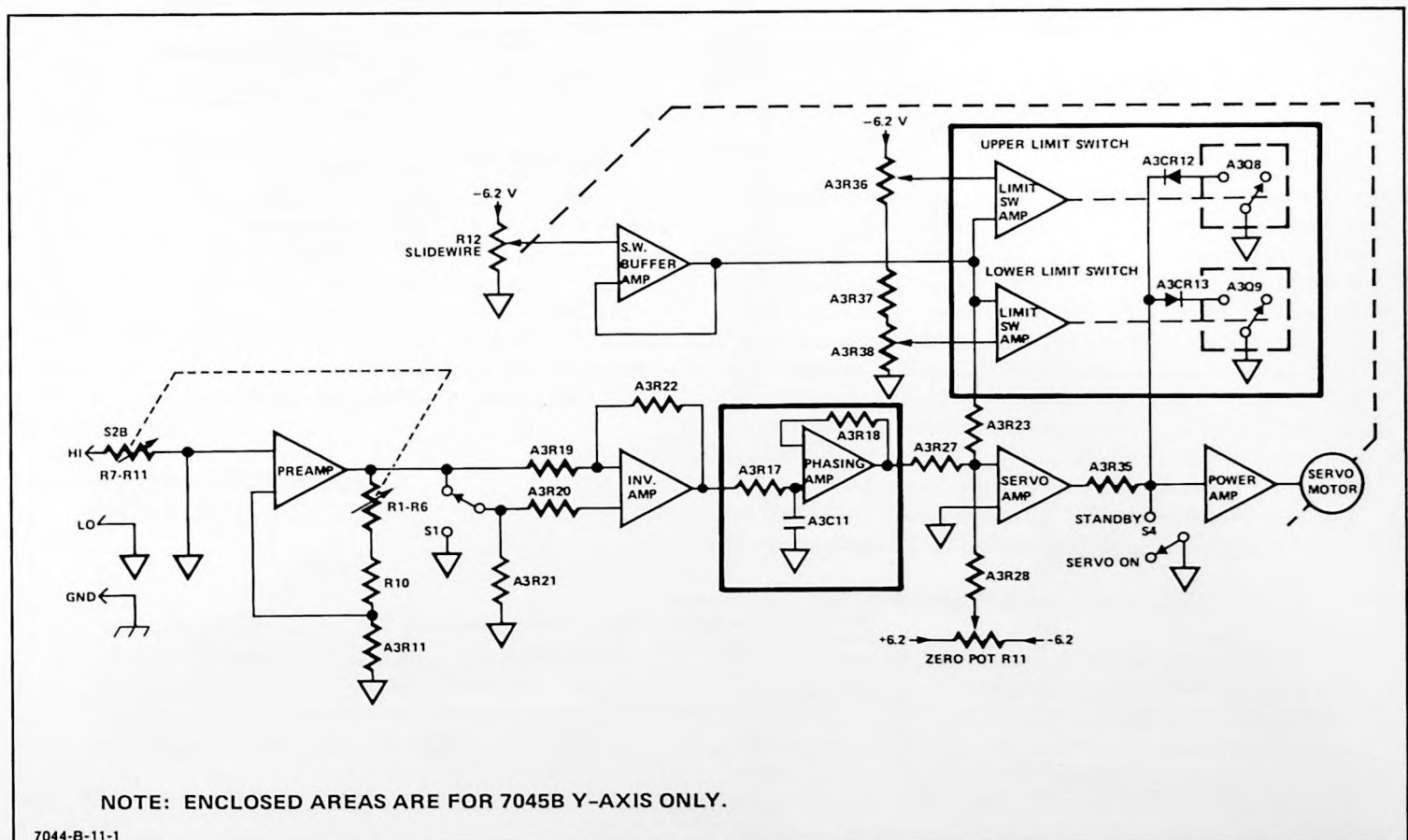


Figure 4-1. Model 7044B X and Y Axes/7045B X Axis Simplified Block Diagram

normal pass band of ≈ 30 Hz, thus minimizing noise pickup and eliminating amplifier oscillations. Voltage offset in transistor Q1 is canceled out by the voltage drop across resistors R5 and R6. Transistors Q2, Q3 and diode VR3 form a constant current source. Input protection diodes VR1 and VR2 prevent the voltage at the gates of transistor Q1 from exceeding 10 V. Resistors R9 and R10 make up the basic stage Gain Ratio 1.2:1. Gain Ratios other than 1.2:1 are achieved by adding gain resistors R1-R6 of the attenuator assembly in series with resistor R10, thus maintaining a preamplifier output of 30mV/cm (60mV/in). Current offset is controlled by resistor network R11 through R16.

4-10. INVERTER.

4-11. Input signal inversion is performed by IC U2 (U3 on 7045B Y-axis), and its associated components. When the POLARITY switch on the front panel is in the positive position, the inputs to U2 are the same to both terminals of the inverter. Since the voltage potential across resistors R17 and R18 is the same, U2 appears to the input signal as a non-inverting unity gain amplifier. With the front panel polarity switch in the negative position, resistor R30

is shorted to common and the input signal sees U2 as a unity gain inverting amplifier. The input signal is coupled from the output of IC U2 through the VERNIER potentiometer to resistor network R22, R23 and R24. The calibration resistor R22 has a value of 3.3 K for English calibrated recorders, and a value of 4.25 K for Metric calibrated recorders. The calibration potentiometer R23 is used to adjust for full scale calibration, while Zero potentiometer R11, in conjunction with R26, supplies input signal current for setting the axis' zero position.

4-12. SERVO AMPLIFIER.

4-13. The Servo Amplifier circuitry consists of IC's U3, and U4, and their associated components. The inverting input of IC U4 (U5 on 7045B Y-axis) is referred to as the Summing Junction and is kept at zero volts when the servo is at null. The inverter IC U2 output is summed together at this point with three other currents. The Zero Control potentiometer current through resistor R26 is summed with the inverter output current to position the pen. In order to monitor pen position once the pen has been moved, a pen position voltage is taken from the slidewire assembly (variable resistor R13), which is directly proportional to

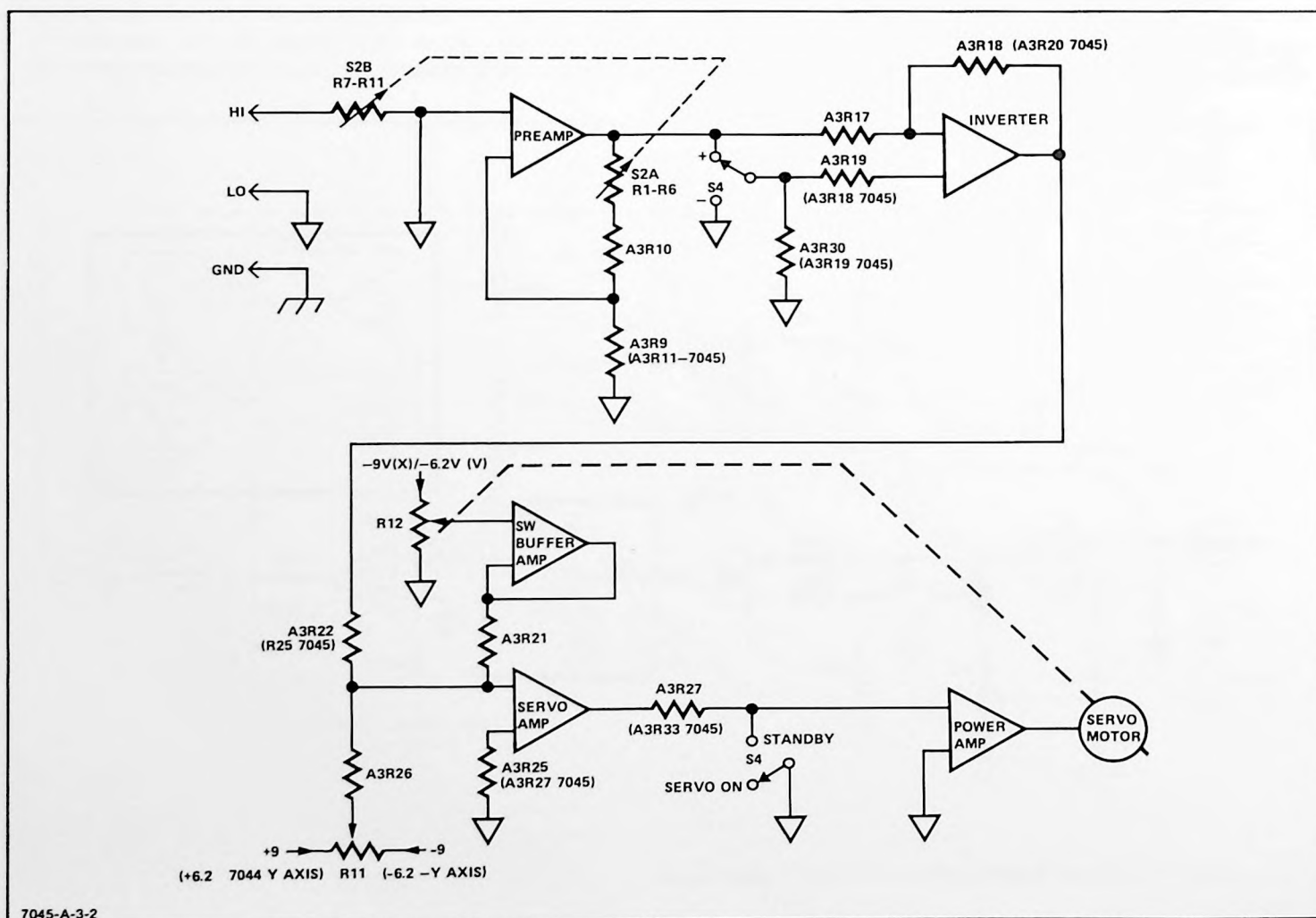


Figure 4-2. Model 7045B Y-Axis Simplified Block Diagram

the pen position. The slidewire is mechanically connected to the pen assembly by means of the slidewire wiper. IC U3 (U4 on 7045B Y-axis) is a unity gain amplifier that provides slidewire current to the summing junction through resistors R20, R21 and capacitor C6. Resistor R20 and capacitor C6 provide damping and phase compensation (C6 is factory selected). The servo feedback current, taken from the power amplifier output (transistors Q4 through Q7) is applied to the summing junction through resistors R34, R35, R36, R40 capacitor C10 and gain potentiometer R37. Resistor R40 and capacitor C10 provide frequency compensation when changes in servo motor velocity occur.

4-14. The sum of the above mentioned currents, at the summing junction, will cancel one another at servo null, thus maintaining the summing junction at zero volts. IC U4 (U5 on 7045B Y-axis) is a high gain linear amplifier and any voltage which appears at the summing junction is amplified by U4 and applied to the power amplifier which includes transistors Q4, Q5, Q6, Q7 and their associated components. The power amplifier supplies the high current needed to drive the servo motor which, in turn, changes the slidewire position. This action changes the slidewire circuit voltage and returns the summing junction to zero volts. A motor protection circuit limits the maximum voltage applied to the servo motor to approximately 10V, this circuit includes diodes CR3, CR4, VR4, VR5 and resistor R38. Resistor R38 is a current sink which assures voltage breakdown for diodes VR4 and VR5. Capacitors C8, C9 and resistor R33 provide impedance matching for driver transistors Q6 and Q7.

4-15. POWER SUPPLY (Y-AXIS)

4-16. The bridge rectifier, diodes CR5 through CR8 with filter capacitors C11 and C12 supply both +24 V and -24 V to the series pass transistors Q8 and Q9. Voltage regulation is accomplished by transistors Q11 and Q12 in conjunction with diodes VR6 and VR7. Base drive is supplied to transistors Q11 and Q12 by resistors R50 and R51 which aid in maintaining regulated outputs of +15 V and -15 V. Reference voltages of +6.2 V and -6.2 V, for the Slidewire and Zero potentiometer are supplied by resistors R43, R44 and diodes VR8, VR9.

4-17. CIRCUIT DESCRIPTION 7045B Y-AXIS AMPLIFIER.

NOTE

The preceding theory for the 7044B Y-AXIS AMPLIFIER is also applicable to the 7045B X and Y-AXIS. The following theory covers the two circuits that are unique to the 7045B Y-AXIS.

4-18. PHASING AMPLIFIER.

4-19. The Phasing Amplifier consists of IC U2 and its associated components. It changes the phase of the Y input

signal to compensate for the mechanical difference between X and Y-axes, by equalizing the velocity lag between axes.

4-20. LIMIT SWITCHES.

4-21. The upper and lower Limit Switches consist of IC U6, transistor Q4 and IC U7, transistor Q5 respectively, along with their associated components. IC U6 and IC U7 serve as voltage comparators that sense when the pen position is in the upper or lower extremity of its travel. When the pen reaches one of these extremities, IC U6 or IC U7 switches transistor Q4 or transistor Q5 to a saturated state, thus clamping the Servo Amplifier output to common in one polarity which prevents the Power Amplifier from driving the Servo Motor any further in the same direction.

4-22. TTL PRINTED CIRCUIT ASSEMBLY (PCA)

4-23. REMOTE CONTROL FEATURES.

4-24. The TTL PCA permits remote control operation of the Time Base (sweep and reset), Pen Lift, Pen Lift with momentary servo mute, Servo Mute, Servo Response (7045B only) and Chart Hold features of the recorder through the 37 pin Rear Connector (see Figure 3-4). TTL control of Pen Lift with momentary servo mute is also available through rear panel Banana Jack connectors. The above mentioned functions are activated by closing relay contacts located on the TTL PCA (see Figure 7-12).

NOTE

As the circuits for the 7044B and 7045B TTL PCA's are similar, only the 7045B PCA circuits are described.

4-25. Relay contact closure is initiated by applying a TTL low, or contact closure to common, to the NAND gate that controls the activating relay of the desired function. Two Quad NAND gates (U1 and U2), with open-collector outputs, are used as inverters to drive transistors Q1 through Q4. These transistors in turn control relays K1 through K5. Diodes: CR3, CR5, CR7 and CR9 are used to ensure a threshold cutoff voltage of approximately +1.2 V. The relays will open at this voltage level regardless of their low voltage opening point. It should be noted that all logic control circuits are references to chassis common and not to the X or Y-axis common. U3 and its associated components form a 100 millisecond servo delay circuit.

4-26. 100 MILLISECOND SERVO DELAY.

4-27. The 100 millisecond servo delay feature is applicable when using an external Sweep Oscillator such as the HP 8620A. The X and Y servo amplifiers are muted for 100 milliseconds when the reset and pen lift commands are received from the Sweep Oscillator. This input is connected to pin 7 of the rear connector or to the Banana Jack connectors. At the end of an X-axis plot, momentary muting of the servo amplifiers allows enough time for the pen to respond to the pen lift command before the X-arm begins

to move, thus eliminating the possibility of a retrace pen stroke.

4-28. The pen lift command (TTL low or contact closure to common) from pin 7 of the rear connector (or Banana Jack connectors) is applied to the inputs of NAND gate U2A and Delay Multivibrator U3 of the TTL PCA (see Figure 7-12). The resulting high output of U2A pin 6 is inverted by U2C and sent to the pen lift control circuit on the power supply PCA. U3 is a delay multivibrator with a Schmitt Trigger input which, along with its associated components, forms the 100 millisecond delay circuit. Capacitor C3 and resistor R11 make up the actual timing circuit for the 100 millisecond delay. The output of U3 is applied to pin 9 of U2B; the output of U2B (pin 8) drives transistor Q4, thus actuating relays K4 and K5, and muting the X and Y servo amplifiers for 100 milliseconds. Ferrite beads E6 and E7 are transient suppressors for reed relay switch S3 and also prevent voltage transients from triggering U3 during CHART HOLD/RELEASE switching to U1C.

4-29. TIME BASE (OPTION 001).

4-30. TIME BASE CIRCUITS.

4-31. The INTEGRATOR and the CONTROL CIRCUIT are the two basic circuits forming the TIME BASE. The INTEGRATOR'S output increases linearly with time thus creating a linear ramp voltage that is applied to the X or Y-axis amplifier. The CONTROL circuit controls the starting, stopping, reset and pen lift functions of the Time Base.

4-32. INTEGRATOR CIRCUIT.

4-33. The Integrator circuit is formed by transistor Q1, IC U3, capacitor C2, switch assembly S3 and their associated components. When K1 relay switch S1 is open, C2 is charged up by operational amplifier IC U3. This generates a linear ramp voltage that is applied to the X or Y-axis amplifier. At the end of a sweep, the voltage at test point 2 (TP2) is approximately 7.5 V.

4-34. When relay K1 is energized, S1 is closed, C2 is discharged and the integrator (sweep) is reset.

4-35. The voltage source network for the integrator circuit is made up by diode VR1, resistors R20, R1, R3 and calibration potentiometer R2. The voltage maintained at TP1 is approximately -1.0 V.

4-36. CONTROL CIRCUIT.

4-37. Time Base sweep is initiated by applying a TTL low or contact closure to common, to IC U1A pin 2. This signal is applied through pin 11 of the Rear Connector, or from the Front Panel Time Base Start Switch. This action, along with a low on IC U1A pin 3, results in a momentary high being applied to IC U2A pin 1, thus setting the NAND-LATCH which is formed by IC U2A, IC U2B and IC U2C. The LATCH is now in the set condition and remains set until IC U2A pin 2 and IC U2C pin 10 receive a low input

signal. The Set condition of the latch results in a low output on IC U2C pin 8 and a high output at pin 6.

4-38. The high output of IC U2B pin 6 is applied to IC U1D, through transistor Q4. IC U4, transistor Q4 and their associated components form a one-shot multivibrator. The output of IC U1D is high and remains high until a reset signal is received by IC U2A pin 2 and IC U2C pin 10. The low output of IC U2C pin 8 is applied to the Power Supply PCA, where it is used to lower the pen to the Chart Table before the axis begins its sweep.

4-39. The low output of IC U2C pin 8 is also applied to Delay circuit transistor Q3 and its associated components which delays the opening of the switch S1 by relay K1, until the pen is lowered. K1 is initially energized upon power up keeping its contacts closed. Once the delayed low output of IC U2C pin 8 reaches the base of transistor Q3, Q3 is turned off, relay K1 is de-energized which starts the sweep ramp charge in the Integrator. The low output of IC U2C pin 8 is also applied to IC U2D pin 12 through resistor R11. IC U2D outputs a ready(bar) signal which is applied to IC U1A, where it is used to gate in the next Sweep Start signal.

4-40. At the end of sweep, the servo motor stalls at the mechanical limits, the voltage at the motor continues to rise and this voltage is sent to transistor Q5 through resistor R9 of the Time Base. As the voltage rises to the breakdown point of diode VR3, (6.81 V) transistor Q5 conducts, energizing relay K2. Once the switch contacts of relay K2 are closed a low input is applied to IC U2A pin 2 and IC U2C pin 10. This action resets the NAND-LATCH and now the output of IC U2B pin 6 is low and the output of IC U2C pin 8 is high, the Time Base is in the RESET condition. The high output of IC U2C pin 8 is used to lift the pen and is sent to transistor Q3 through the delay circuit of resistors R16, R17, diode CR1 and capacitor C6 which allows the pen time to be raised before the axis moves back to its starting position. Once transistor Q3 is turned on, relay K1 is energized and the Integrator resets.

4-41. When the NAND-LATCH resets a momentary high input is applied to IC U2D pin 12 and a momentary low is applied to diode CR4. Transistor Q4 and IC U10 form a Ready Delay One-Shot Multivibrator. When the momentary low is applied to diode CR4 the output of IC U10 pin 13 goes low for approximately one second. This causes Ready to go high for one second preventing IC U1A from transmitting a new sweep start signal until the pen has had time to respond to the reset signal and return to zero.

4-42. A Reset signal can also be applied through the Rear Connector or from the Front Panel Time Base Reset switch. A Reset received from either of these sources is applied to IC U1B pins 5 and 6 of the Time Base. This action allows transistor Q2 to conduct thus applying a low input to IC U2A pin 2 and to IC U2C pin 10. The NAND-LATCH resets and initiates the appropriate actions for resetting the Time Base. Capacitor C5 and resistor R21 form a delay network to ensure that the Latch Reset Pulse is long enough in duration to trigger transistors Q3 and Q4.

SECTION V

MAINTENANCE, PERFORMANCE CHECKS, AND ADJUSTMENTS

5-1. INTRODUCTION.

5-2. This section provides information on maintenance, performance testing and adjustments for the Models 7044B and 7045B X-Y Recorders. The procedures outlined in this section will ensure that the recorders conform to the specifications listed in Table 1-1. If these specifications are not met or if the recorders become inoperable, refer to Section VII, Troubleshooting.

5-3. PREVENTIVE MAINTENANCE.

5-4. INTRODUCTION.

5-5. These recorders must be maintained properly for accurate, trouble-free operation. This requires periodic cleaning, lubrication along with mechanical and electrical maintenance.

5-6. ENVIRONMENTAL OPERATION.

5-7. These instruments are designed to operate over an ambient temperature range of 0°C to 55°C. Operation under other conditions will produce inaccurate results and may cause damage to the recorder. In areas with high humidity, graph paper may expand, affecting the accuracy of the grid lines. The area of operation should also be as free as possible of air contamination (soot, smoke, fumes, etc.). Frequent cleaning of the recorders will be required if they are exposed to excessive air contamination.

5-8. CLEANING.

5-9. Thorough cleaning should be performed periodically. Intervals are determined by type of operation, local air contamination, and climatic conditions. Under normal use and conditions, cleaning intervals should be nine to twelve months. Cleaning routine should include the following:

- a. Remove platen and bottom cover. See paragraph 5-18, steps b and c.
- b. In hard to reach areas where there is only dust accumulation, cleaning can be accomplished with an air gun. In more accessible areas, dirt, dust, or ink accumulation, should be removed with a sponge or cloth saturated in plain soap and warm water, then wiped dry.
- c. Every 18 to 24 months, gears should be cleaned thoroughly with a solvent and relubricated. Do not use soap or water on these components.
- d. The following method is recommended for cleaning the Electrostatic Table. Dust and other accumulation of

foreign films on the table surface will lower the paper holding force. The film may be removed and table holding ability restored by using the following procedure. If strong chemicals, silicone-based cleaners, or too much water is used, the table may be permanently damaged. To clean:

1. Prepare a mixture of 50% isopropyl alcohol and 50% water by volume.
2. Apply the alcohol/water mixture to the table using a Kimwipe®. Immediately wipe any moisture from the surface. Never let any liquid stand on table surface as the surface may become permanently damaged.

If the surface cannot be easily cleaned with the alcohol/water mixture, cleaning can be accomplished as follows:

1. Select a clean, lint-free cloth that will not scratch the table surface.
2. Dampen the cloth with warm water or alcohol and apply a light amount of cleanser (HP 9310-0515). A commercial cleanser such as Ajax®, Comet®, or Vim may be used.
3. Wipe the table surface until it is clean, then rinse the cloth and wipe any remaining cleanser from the table.

CAUTION

Never let water stand on the table surface, or enter the electrical hardware area of the recorder.

4. Wipe any moisture from the table surface.
5. Allow the table to dry before recording.

WARNING

Scratches or punctures in the table surface may expose high voltage conductors. Instruments damaged in this manner should NOT BE OPERATED.

5-10. POTENTIOMETER CLEANING.

5-11. Irregular or jumpy recordings produced by smooth signals on a properly adjusted recorder may indicate worn or dirty potentiometers or wipers. To clean:

- a. Slide pen carriage to extreme right.

- b. Remove rear hood assembly. See paragraph 5-18, step b.
- b. Remove platen for X-axis potentiometer cleaning. See paragraph 5-18, step a.
- c. Lift pen holder up. Raise pen scale. Slidewire is accessible. See Figure 5-1.
- d. Spray entire potentiometer and wiper with Slidewire Cleaner, Part Number 5080-3605. Rapidly move pen carriage through several excursions.
- e. Thoroughly saturate a Kimwipe or cotton swab with cleaner. Rub potentiometer along entire length using tissue or swab. See Figure 5-1.

NOTE

If there is discoloration on tissue or swab, repeat until there is no stain. Then clean once more to ensure all contaminants are removed.

5-12. LUBRICATION.

5-13. This is a precision instrument. Gears and other moving parts have very close tolerances. Intervals between periodic lubrication are determined by the type of operation, local air contamination, and climatic conditions. All ball bearings are pre-lubricated. No lubrication is needed for them. The procedure for periodic lubrication is as follows:

- a. Clean balance potentiometer and clean X-axis slider rod with dry Kimwipe every 3 to 6 months. See paragraph 5-11.
- b. Every 18 to 24 months:
 - 1. Clean and lubricate drive gears and guide under Y-axis slider rod with light grade silicone grease, Part Number 6040-0297. A light film of grease is sufficient.



Figure 5-1. Potentiometer Cleaning

- 2. Clean and lubricate Y-axis slider rod with instrument oil, Part Number 6040-0220.

- 3. Clean X-axis slider rod with dry Kimwipe; do not lubricate.

CAUTION

Do not use slidewire lubricant on either the X or Y slidewires.

5-13A. To reduce the high thermal impedance present between the Servo Motor surface and the Main Frame Assembly, use thermal joint compound (Part Number 6040-0239) to fill the minute air gap between the mating surfaces. This compound is a grease-like material that contains zinc oxide and silicone oil. Apply the thermal compound to the X-axis motor surface, motor washers, and main frame assembly. Figures 5-2A and 5-2B show the servo motor area affected.

5-14. VISUAL INSPECTION AND MECHANICAL FREEDOM TEST.

5-15. During periodic cleaning and lubrication, a planned inspection should be performed. The following steps are a general approach.

- a. Check both X and Y drive gears for proper adjustment (zero backlash), and any worn or damaged teeth.
- b. Inspect X-axis drive cable pulleys for any binding.
- c. Ensure servo motors are mounted securely.
- d. Slide pen carriage through several excursions, listening for scrapes, grinding noises, etc., while feeling for any binding in the movement. Repeat procedure for carriage arm. If binding or other problem exists, perform step g.
- e. Check cables of both axes for evidence of fraying or rubbing.
- f. Check components for evidence of overheating, loose connections, cracked circuit boards, or other defects.
- g. Remove bottom cover per paragraph 5-18, step b. Disconnect X servo motor from X-axis Amplifier Board. Connect servo motor to output of Power Supply. Let Power Supply for output of 3 V for 7044B or 1.5 V output for 7045B recorder. Monitor on Digital Voltmeter. Servo motor should drive X-axis arm from one stop to another. If arm stops along travel, mechanical bind may exist. Clean slider rod. If situation continues, perform paragraph 5-87, step f, correct bind, or replace servo motor per paragraph 5-30.
- h. Repeat step g for the Y-axis. For both models, set Power Supply for output of 3 V.

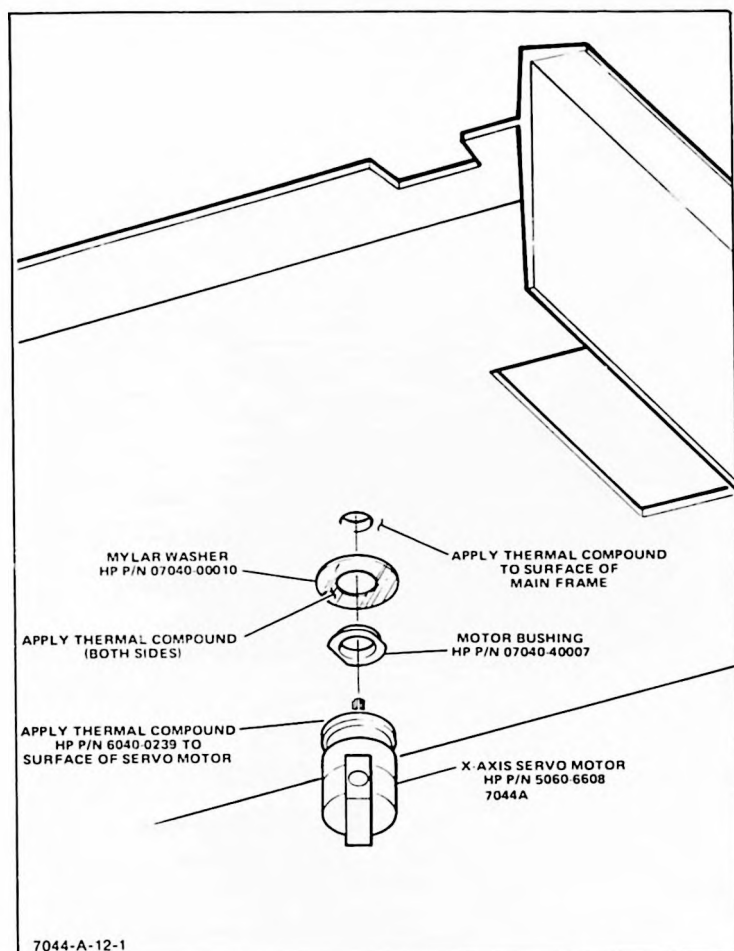


Figure 5-2A. Small X-Axis Servo Motor Assembly
(Thermal Compound Application, Model 7044B)

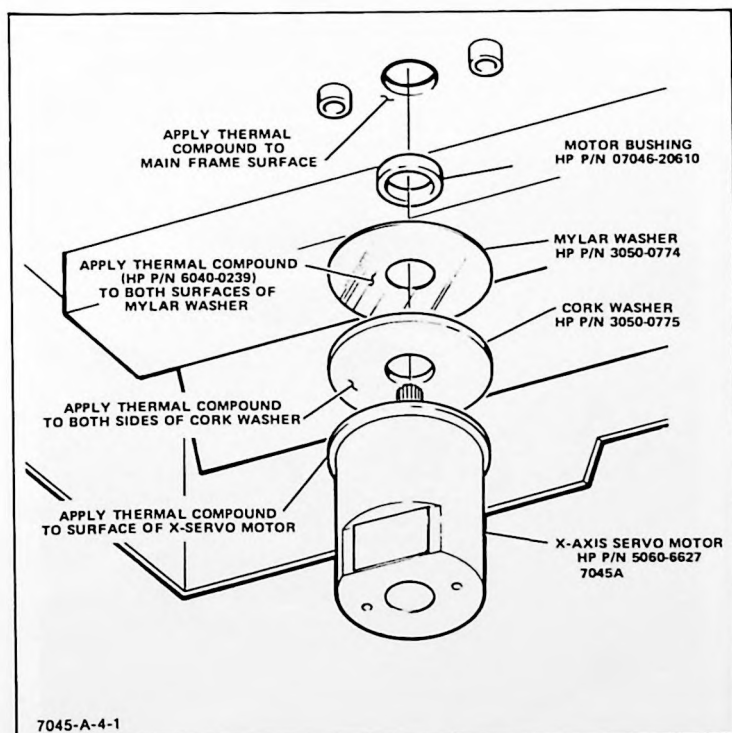


Figure 5-2B. Large X-Axis Servo Motor Assembly
(Thermal Compound Application, Model 7045B)

5-16. MECHANICAL MAINTENANCE.

5-17. DISASSEMBLY/ASSEMBLY.

5-18. Access to components for maintenance, checks, and adjustments require removal of exterior parts first, such as panels, covers, etc. To remove certain parts, perform the following procedures:

- Rear Hood Assembly — remove two screws from back side of cover.
- Bottom Cover — set on front (panel at bottom). Remove six screws. All circuit boards are visible.
- Autogrip Table — for maintenance on X-axis potentiometer, wipers, cable assembly, etc., remove four screws, slide pen carriage to right, ease platen up and out on left side, disconnecting two pins to Power Supply Board before easing platen all the way out.

NOTE

The majority of screws in the two models are Phillips; however, there is a new and improved type called POZIDRIV. These screws are less likely to deform or strip, provided the special POZIDRIV screwdriver is used. Two models are available, the small model, Part Number 8710-0899, and the larger one, Part Number 8710-0900.

5-19. X-AXIS POTENTIOMETER REPLACEMENT.

5-20. To remove and replace X-axis Balance Potentiometer, perform the following steps.

- Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.
- Place recorder right side up. Remove one screw holding wiper block to slider block. Ease out carefully as wiper assembly is easily damaged.
- Slide carriage arm to right side. Stand recorder on right side. Remove three nuts holding potentiometer from underside of recorder. See Figure 5-3.
- Remove screw retaining left end of X slider rod and loosen screw on right end.
- Partially ease out X-axis balance potentiometer.
- Carefully unsolder three wires from potentiometer (note wire colors).
- Remove potentiometer. Lift slider rod to allow clearance.
- Install new balance potentiometer, Part Number 07040-60570.
- Reassemble, reversing procedures.

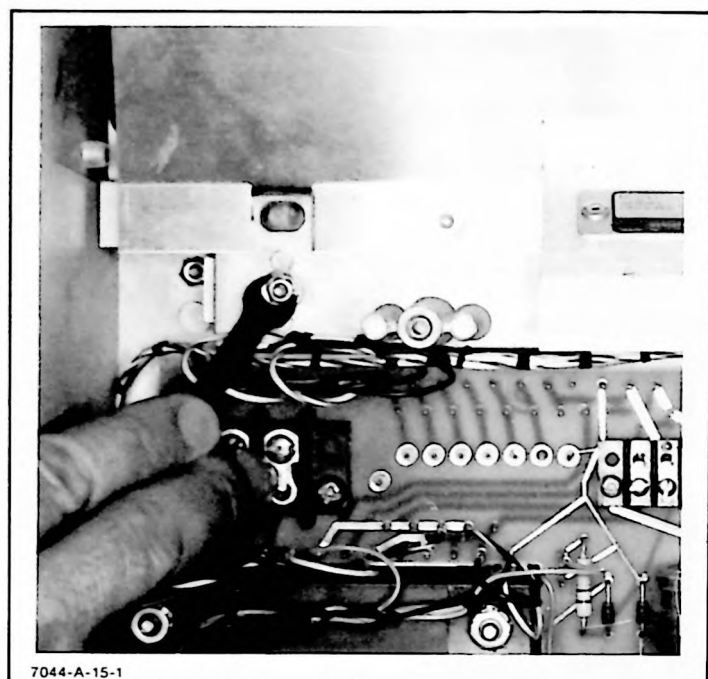


Figure 5-3. X-Axis Potentiometer Replacement

5-21. X-AXIS WIPER REPLACEMENT.

5-22. The wiper assembly is manufactured with very close tolerances necessary for long life and reliability. The wiper is located on the X-axis wiper block. To remove, perform step b, paragraph 5-20. Install new wiper, Part Number 5080-8117 with the same screw that held the old wiper.

5-23. Y-AXIS POTENTIOMETER REPLACEMENT.

5-24. To remove and replace Y-axis Balance Potentiometer:

- a. Remove disposable pen. Remove Rear Hood Assembly and platen. See paragraph 5-18.
- b. Unhook spring at right side of pen lift bar. Snap off retaining ring at right end of pen lift bar. Lift bar up and out. See Figure 5-4.
- c. Insert small flat blade screwdriver under drive cable near Y-axis servo motor pinion. Pry up on cable while turning gear/pulley clockwise. Cable will snap free.
- d. Remove screw at motor end of carriage arm. See Figure 5-5.
- e. Carefully press slidewire wipers free of potentiometer to prevent damage while easing potentiometer assembly from under slider rod/carriage assembly. Free Y-axis stringing from bottom pulley.
- f. Unsolder three wires from potentiometer. Note wire colors.
- g. Y-axis balance potentiometer assembly should now be free of recorder. See Figure 5-6. Remove bottom pulley assembly and install on new potentiometer assembly, Part Number 07040-60550.
- h. Restrung Y-axis. Reassemble, reversing procedure.
- i. Lubricate slider rod, guide under slider rod, and balance potentiometer.

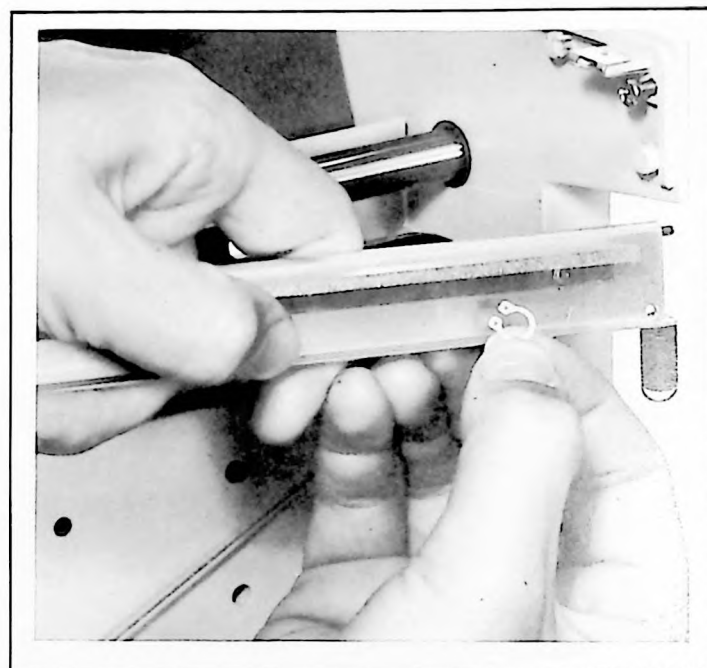


Figure 5-4. Pen Lift Bar Removal

5-25. Y-AXIS WIPER REPLACEMENT.

5-26. The wiper assembly is located on the Y slider block inside the recording arm. To remove, perform the following steps:

- a. Remove disposable pen. Remove Rear Hood Assembly and platen. See paragraph 5-18.
- b. Lift open Y scale.
- c. Move Y slider block toward bottom of recording arm.
- d. Carefully insert small piece of heavy paper or card between Y wiper contacts and slidewire to protect potentiometer.



Figure 5-5. Carriage Arm Removal

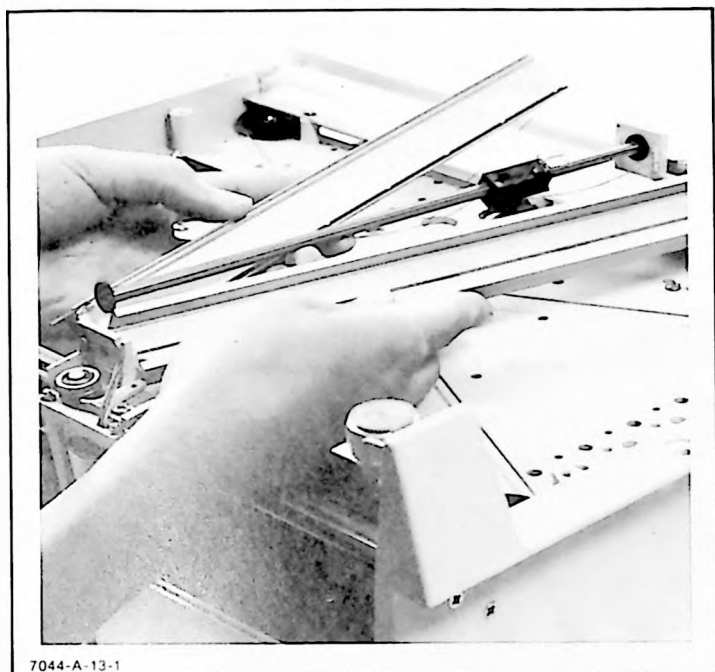


Figure 5-6. Y-Axis Balance Potentiometer Removal

e. Remove wiper assembly held by one screw.

f. Install new wiper, Part Number 07046-60440, reversing procedure. Clean and lubricate potentiometer, see paragraph 5-11.

5-27. X-AXIS DRIVE GEAR REPLACEMENT.

5-28. To replace the X-axis drive gear, perform the following procedure:

a. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.

b. Loosen X-axis stringing by loosening screw on slider block. See Figure 5-7. Remove stringing from drive gear. Use masking tape to hold string in place.

c. Stand recorder on front side, hold nut and remove a No. 6-32 screw mounting gear. Remove gear. See Figure 5-8.

d. Replace with new gear assembly, Part Number 07046-60410.

e. Reassemble in reverse. Restring per paragraph 5-33 for 7044B or 5-34 for 7045B.

f. Adjust gear backlash per paragraph 5-78.

5-29. SERVO MOTOR MAINTENANCE.

5-30. The servo motors are basically free from maintenance. The high thermal mass aluminum frames and all ball-bearing construction provide long life. Do not disassemble a servo motor as this will result in weakening the magnetic field strength and produce substandard performance. If it becomes



Figure 5-7. X-Axis Stringing Removal

necessary, however, to replace either the X or the Y-axis servo motor, perform the procedure indicated in the following steps:

a. X-Axis Servo Motor.

1. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.

2. Stand recorder on front side. Unsolder two wires from feedthrough capacitors. Note wire colors. Remove third lead (ground) by removing Phillips screw.

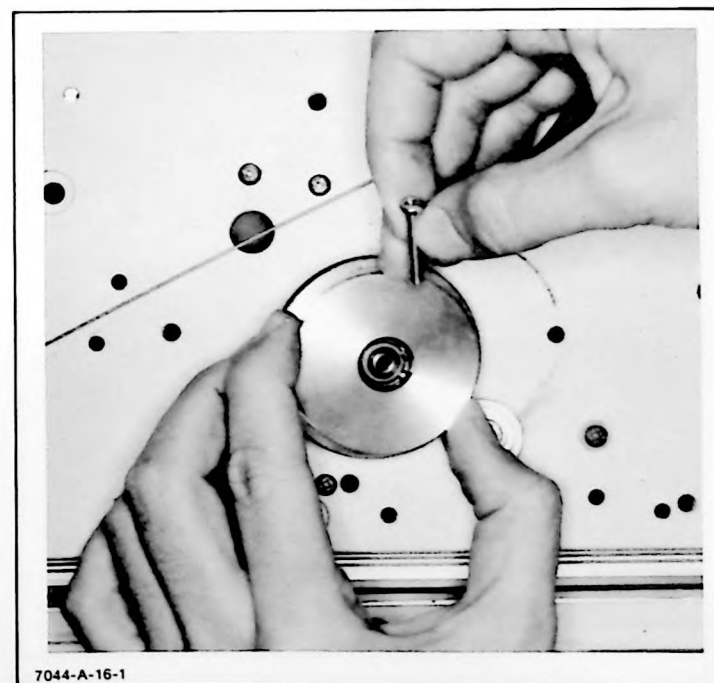


Figure 5-8. Drive Train Bearing Replacement

CAUTION

Use care not to break off feedthrough capacitors when unsoldering leads as this will result in irreparable damage to the motor.

3. Remove one screw holding clamp and servo motor to casting on 7044B model. Replace with new unit, Part Number 5060-6608.

4. From front side, remove two No. 6-32 screws holding servo motor casting on 7045B model. Replace with new unit, Part Number 5060-6627.

5. Adjust gear backlash per paragraph 5-78.

b. Y-Axis Servo Motor.

1. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.

2. Unhook spring at right side of pen lift bar. Snap off retaining ring at right end of pen lift bar. Lift bar up and out. See Figure 5-4.

3. Stand recorder on front side. Slide carriage arm to extreme right as viewed from rear of recorder.

4. Remove two Phillips POZIDRIV screws holding plate behind motor. Position plate and cable clear of motor. See Figure 5-9.

5. Unsolder two wires from feedthrough capacitors. Remove third lead (ground) by removing screw.



Figure 5-9. Y-Axis Servo Motor Replacement — Bottom Plate and Trailing Cable

CAUTION

Use care not to break off feedthrough capacitors when unsoldering leads as this will result in irreparable damage to the motor.

6. Remove screw, nut, and washer holding servo motor mounting clamp to motor.

7. Connect wires to new servo motor, Part Number 5060-6608. Replace shrink tubing before installing servo motor.

8. Install servo motor.

5-31. Y-AXIS RESTRINGING.

5-32. To restring, using Y-axis cable assembly, Part Number 07040-60913, perform the following procedure:

a. Remove disposable pen. Remove Rear Hood Assembly, Pen Lift Bar, and separate slider rod/carriage arm from potentiometer assembly. See paragraph 5-24, steps a through e and Figure 5-4. Remove old drive cable assembly.

b. Install new drive cable assembly consisting of cable spring, cable crimps, cable mounting bracket, and seven-strand stainless steel cable as follows (see Figure 5-10):

1. Install new cable mounting bracket to slider block with four screws previously removed.

2. Insert spring into same hole in cable mounting bracket to which other end of cable is attached.

3. Reassemble carriage arm, making sure cable is between pen block and slidewire. Care should be taken not to damage wiper.

4. Loop cord around upper and lower pulleys.

c. Reassemble.

d. Check wiper tracking. Minor adjustments can be made by twisting metal wiper base with force from small screwdriver.

5-33. 7044B X-AXIS RESTRINGING.

a. Remove rear hood and platen. See paragraph 5-18, steps a and c.

b. Scribe ends of lower paper guide located on front side under the lower carriage arm to make realignment easier. Remove guide by removing three screws.

c. Place carriage arm in center of travel. Remove old stringing by taking out screw on slider block and loosening adjustment nut at bottom of arm. Block slides out to expose loop part of stringing. Unwind. See Figure 5-7.

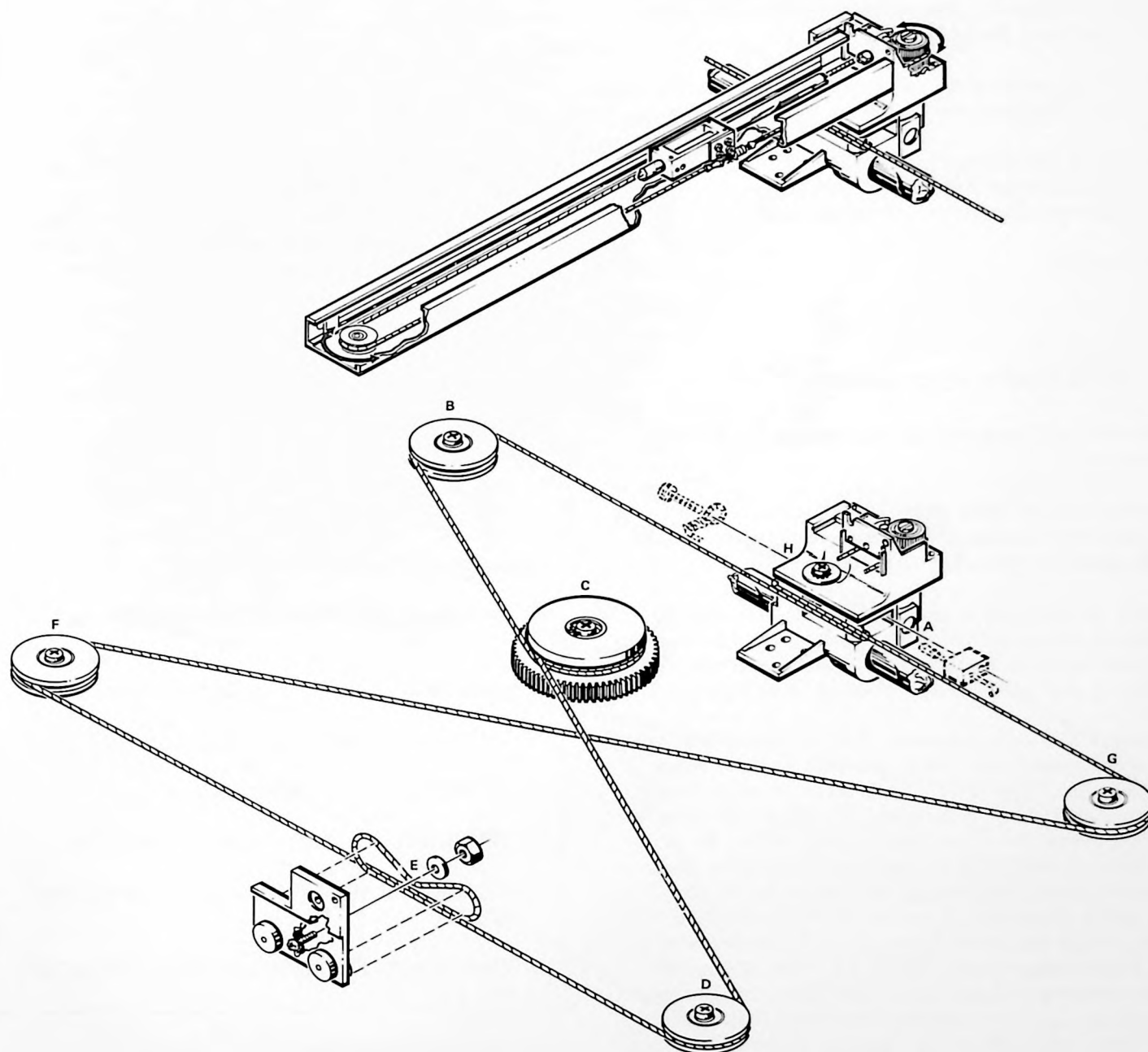


Figure 5-10. X and Y-Axis Restringing, 7044B Model

d. Using X-axis cable assembly, Part Number 07040-60914 attach loop around screw (Point A). See Figure 5-10. Place screw in slider block. Route cable in clockwise direction around pulley (Point B) to drive chain pulley (Point C). Loop in clockwise direction around pulley two times. Proceed to left corner pulley (Point D). Loop in clockwise direction around carriage arm block (Point E) going on outside of pulley to right corner pulley (Point F). Pass cable under previous stringing to loop around last pulley in left upper corner (Point G). The stringing terminates at other end of slider block (Point H).

e. At Point H, insert plastic adjustment block into hole in slider block. Tighten screw at Point A until stringing is taut.

f. Perform X-axis Cable Tension Adjustment, paragraph 5-74, X-axis Alignment Adjustment, paragraph 5-80, and Y-axis Alignment Adjustment, paragraph 5-82.

g. Reassemble.

5-34. 7045B X-AXIS RESTRINGING.

a. Remove rear hood and platen. See paragraph 5-18, steps a and c.

b. Scribe ends of lower paper guide located on front side under the lower carriage arm to make realignment easier. Remove guide by removing three screws.

c. Place carriage arm in center of travel. Remove old stringing by taking out screw on slider block and loosening adjustment nut at bottom of arm. Block slides out to expose loop part of stringing. Unwind. See Figure 5-7.

d. Using X-axis cable assembly, Part Number 07041-60009 insert plastic adjustment block into hole in slider block (Point A). See Figure 5-11. Place screw in slider block and thread into plastic adjustment block. Route cable in counterclockwise direction around pulley (Point B) to drive pulley (Point C). Loop in counterclockwise direction around pulley two times. Proceed to lower right corner pulley (Point D). Loop in clockwise direction around carriage arm block (Point E) going on inside of pulley to left corner pulley (Point F). Pass cable under previous stringing to loop around last pulley in right upper corner (Point G). The stringing terminates at the other end of slider block (Point H). Remove screw holding plastic adjustment block. While holding block in position, insert screw through cable loop and into slider block.

e. Tighten screw at Point A until stringing is taut.

f. Perform X-axis Cable Tension Adjustment, paragraph 5-74, X-axis Alignment Adjustment, paragraph 5-80, and Y-axis Alignment Adjustment, paragraph 5-82.

g. Reassemble.

5-35. ELECTRICAL MAINTENANCE.

5-36. REQUIREMENTS.

5-37. The 7044B and 7045B Models require minimum electrical maintenance. They are carefully aligned during manufacture. However, if these recorders ever require alignment, specific adjustment procedures are detailed in this section. Section VII, Troubleshooting, contains additional material.

5-38. PERFORMANCE TESTS.

5-39. CRITERIA.

5-40. These instruments should meet the following Hewlett-Packard performance standards to assure operation within specifications. If these instruments fail to meet the following test specifications, refer to Adjustment Procedures within this section or Section VII, Troubleshooting.

5-41. TEST EQUIPMENT.

5-42. The instruments and accessories required for completing these performance tests are listed in Table 5-1.

TABLE 5-1. RECOMMENDED TEST EQUIPMENT

1. HP MODEL 3440A DIGITAL VOLTMETER WITH HP MODEL 3441A PLUG-IN.
2. HP MODEL 6203B POWER SUPPLY.
3. BAUSH & LOMB MEASURING MAGNIFIER NO. 81-34-35.
4. HP MODEL 3310A FUNCTION GENERATOR
5. HP MODEL 740B DC VOLTAGE STANDARD.
6. HP MODEL 1740A OSCILLOSCOPE
7. HP MODEL ET TIME MARK GENERATOR
8. GENERAL RADIO MODEL 1826C MEGOHM-METER
9. CHATILLON TENSION GAUGE-R. CATALOG NO. 516-500.

5-43. INITIAL CHECKS.

5-44. To perform initial checks:

- a. Position voltage selector switches to the available line voltage.
- b. Position POLARITY switches to +RT (X-axis) +UP (Y-axis).
- c. Switch on LINE, CHART, SERVO, and PEN.

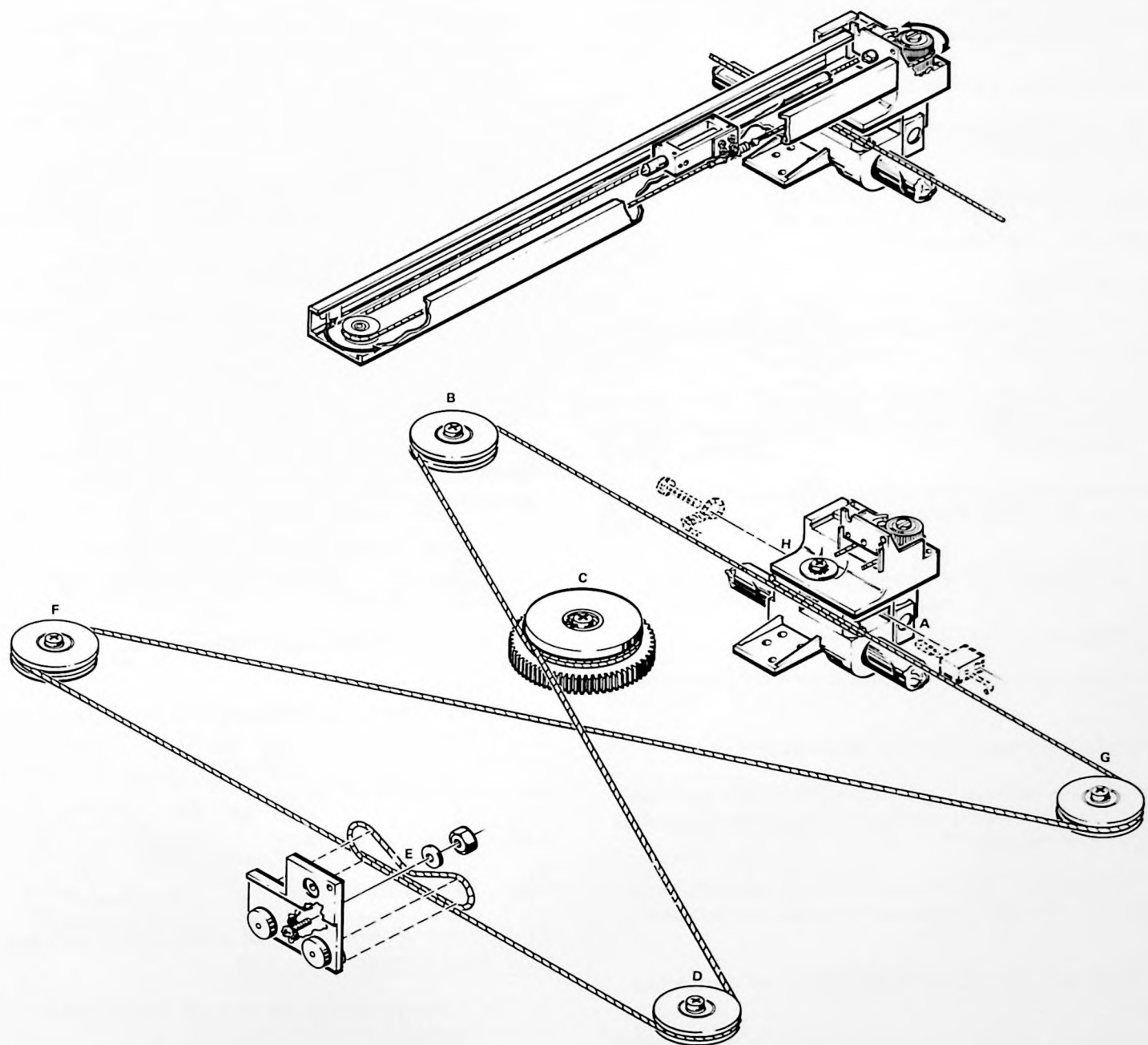


Figure 5-11. X and Y-Axis Restraining, 7045B Model

- d. Connect DC Standard to X-axis HI and LO input terminals.
- e. Apply positive dc voltage. Pen moves upscale.

NOTE

Some DC Standards produce large amounts of random noise on low level ranges. If noise is a problem, use a higher range and attenuate the voltage down to recorder sensitivity.

- f. Return pen to zero position.
- g. Remove DC Standard from X-axis. Connect to Y-axis input terminals.
- h. Apply positive dc voltage. Pen should move upscale.
- i. Disconnect DC Standard.

5-45. RETRACE.

5-46. To perform the retrace check, install the disposable pen and chart paper. Set the controls:

Chart Switch — HOLD
Power Switch — ON
Servo Switch — ON

Make connections as shown in Figure 5-11A. Set the controls of the HP 3310A as follows:

Power — ON
Frequency — 0.071 Hz for 7044B; 0.35 Hz for 7045B
Waveform — Triangular wave

a. To make a retrace check with a slope of 1/1, proceed as follows:

1. Set RANGE switches to 0.1 V/in. (0.05 V/cm).
2. Gradually increase amplitude of HP 3310A until both axes have a travel of seven inches (18 cm) centered approximately around midscale.
3. Drop the pen. The recorder should draw a line at approximately a 45 degree angle and about ten inches (25 cm) long.
4. Allow the pen to draw a single line, then retrace this line once.

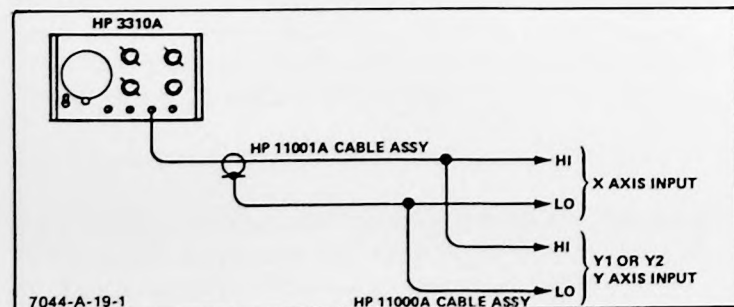


Figure 5-11A. Retrace Test Setup

5. The width of the retraced line should be no greater than 0.010 inches (0.25 mm) plus the width of the single pen line. If retrace width is greater, check mechanical freedom and X and Y amplifier gain.

b. To make a retrace check with a slope of 5/1, proceed as follows:

1. Set X-RANGE switch to 0.5 V/in. (0.25 V/cm) and Y-RANGE switch to 0.1 V/in. (0.05 V/cm). Set the Function Generator to 0.071 Hz triangular wave.

2. Drop the pen. The recorder should draw a line at approximately a 78.7 degree angle, about seven inches (17.8 cm) in the Y-direction.

3. Allow the pen to draw a single line, then retrace this line once.

4. The width of the retraced line should be no greater than 0.015 inches (0.38 mm) plus the width of the single pen line. If retrace width is greater, check mechanical freedom and X-axis amplifier gain.

c. To make a retrace check with a slope of 1/5, proceed as follows:

1. Set Y-RANGE switch to 0.5 V/in. (0.25 V/cm) and X-RANGE switch to 0.1 V/in. (0.05 V/cm). Set the Function Generator to 0.05 Hz triangular wave.

2. Drop the pen. The recorder should draw a line at approximately a 11.3 degree angle and about 10 inches (25 cm) in the X direction.

3. Allow the pen to draw a single line, then retrace this one once.

4. The width of the retraced line should be no greater than 0.015 inches (0.38 mm) plus the width of the single pen line. If retrace width is greater, check mechanical freedom and Y-axis amplifier gain.

5-47. Y-AXIS ACCURACY

5-48. To perform this test:

a. Connect DC Standard with 0 volts output to Y-axis HI and LO input terminals.

b. Place pen at exactly on zero on Y-axis and approximately 5 in. (12.5 cm) in X-axis.

c. Set Y-axis RANGE switch to 100 mV/in. (50 mV/cm).

d. Apply 1 volt to Y input terminals.

e. Pen should stop at 10 inches \pm 0.02 in. (20 cm \pm 0.50 mm). Use Bausch & Lomb Measuring Magnifier No. 81-34-35, or equivalent, for an exact measurement.

f. If pen does not stop at this point, adjust CAL control (A2R23-7044B) (A2R26-7045B) on Y-axis DC Amplifier Board. Repeat steps d and e.

- g. Reduce voltage applied in equal 100 mV increments.
- h. After each step, pen should stop at 1 inch \pm 0.02 in. (2 cm \pm 0.50 mm).

5-49. X-AXIS ACCURACY.

5-50. Perform the following procedure:

- a. Connect DC Standard with 0 volts output to X-axis HI and LO input terminals.
- b. Place pen at exactly zero on X-axis and approximately 5 in. (12.5 cm) on Y-axis.
- c. Set X-axis RANGE switch to 100 mV/in. (50 mV/cm).
- d. Apply 1.5 volt to X input terminals.
- e. Pen should stop at 15 in. \pm 0.03 in. (30 cm \pm 0.76 mm).
- f. If pen does not stop at this point, adjust CAL control (A3R23-7044B) (A3R24-7045B) on X-axis DC Amplifier Board. Repeat steps d and e.
- g. Reduce voltage applied in equal 100 mV increments.
- h. After each step, pen should stop at 1 inch \pm 0.03 in. (2 cm \pm 0.76 mm).

5-51. INPUT RESISTANCE.

5-52. To check X and Y axis, perform the following steps:

- a. Connect 1 meg \pm 1% precision resistor in series with X-axis HI input terminal.
- b. Apply 1.5 volts from DC Standard to X input terminals.

c. Pen should move 7.5 inches (15 cm) rather than full scale.

d. Disconnect DC Standard and 1 meg resistor and connect to Y-axis terminals. Apply 1 volt to Y input terminals.

e. Pen should move 5 inches (10 cm) rather than full scale.

f. If error more than \pm 0.38 in. on X-axis or \pm 0.25 in. on Y-axis of pen travel, perform calibration check, then repeat procedure.

5-53. Y-AXIS SLEWING SPEED.

5-54. Make the following connection as shown in Figure 5-12 before performing this test.

a. Set X-axis and Y-axis RANGE switches to 100 mV/in. (50 mV/cm).

b. Set Function Generator to 0.5 Hz triangular wave output and amplitude to full counterclockwise. Connect to X-axis.

c. Open switch S1 on Power Supply. Set Power Supply for output of approximately 1 V for 7044B or 7045B test. Connect to Y-axis.

d. Place pen on bottom grid line. Turn on LINE, CHART, SERVO, and PEN.

e. Set Function Generator on X-axis for 10 inches (25 cm) peak-to-peak excursion.

f. At center of X-axis travel, close S1 switch. After pen has slewed to full scale, position SERVO toggle switch to STANDBY. Plot in Figure 5-13 indicates pen moves greater

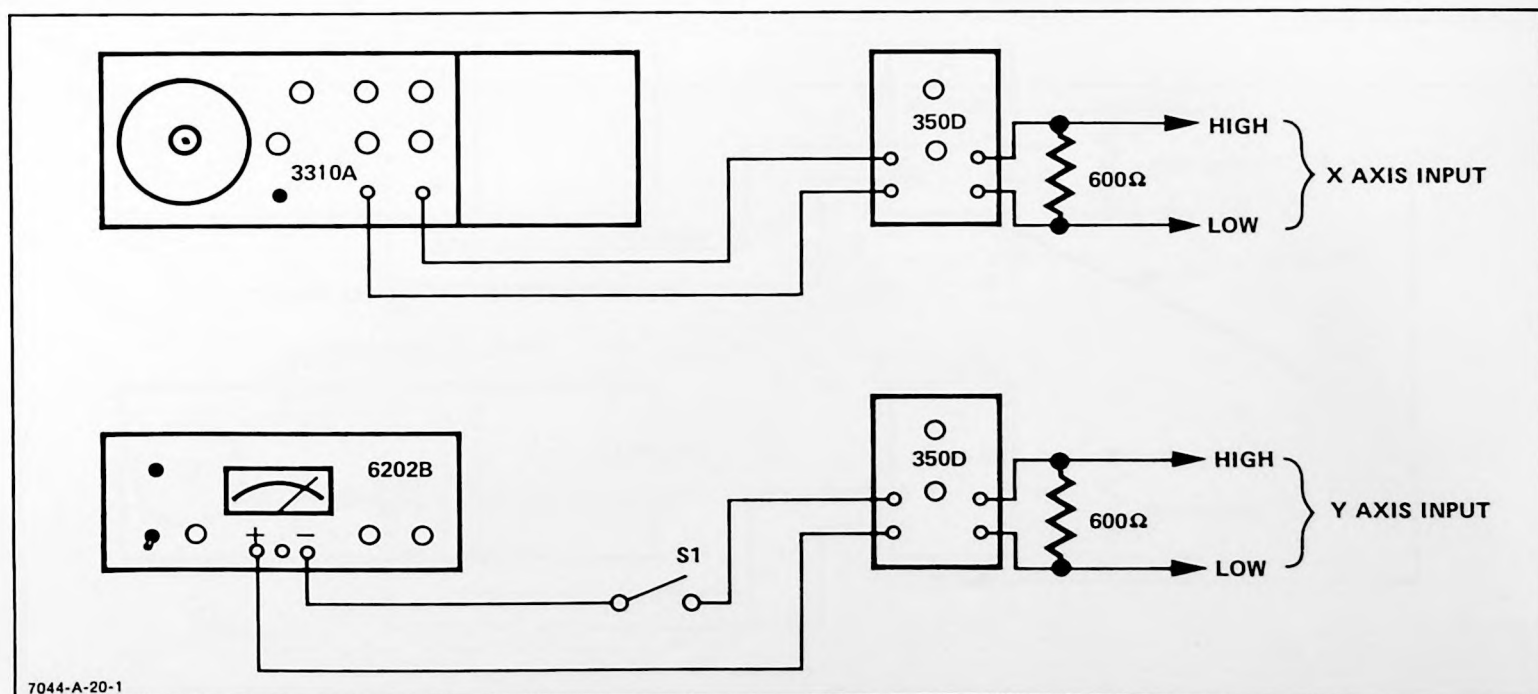


Figure 5-12. Y-Axis Slew Speed Test Setup

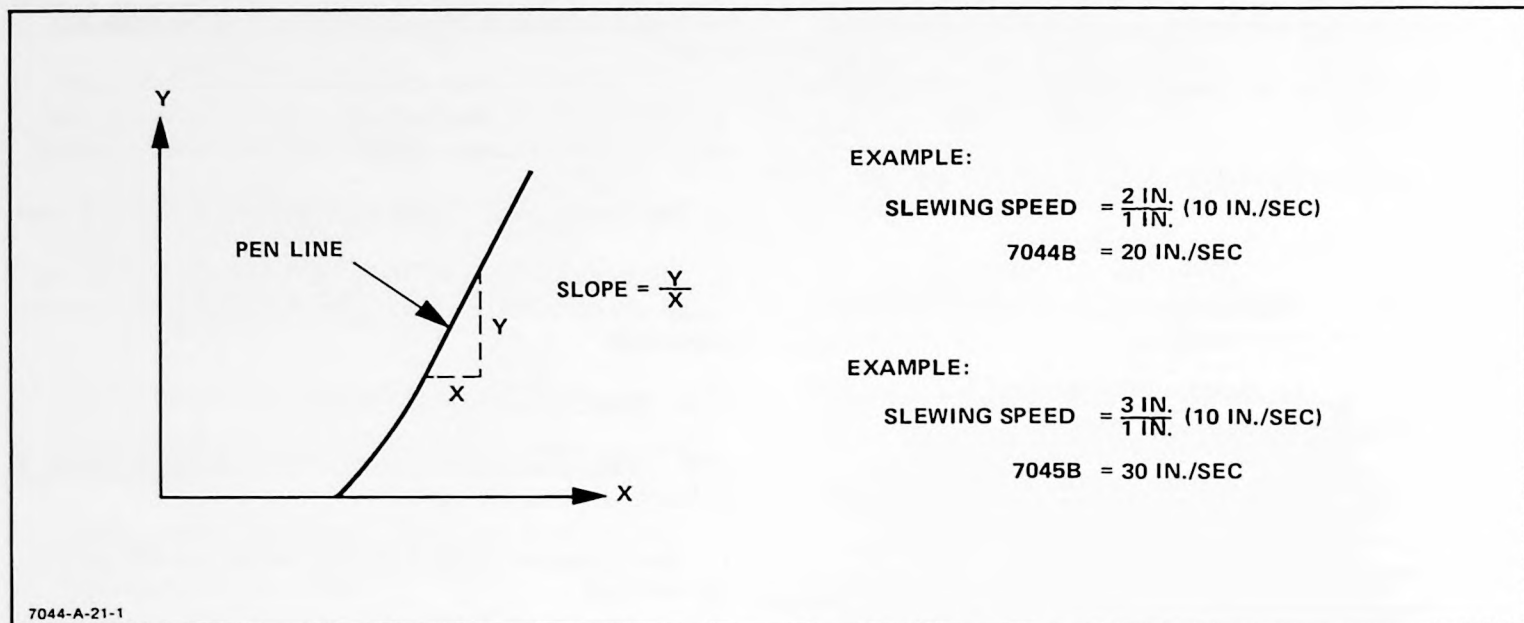


Figure 5-13. Y-Axis Slewing Speed — 7044B and 7045B Models

than 2 inches in Y direction for 1 inch movement in X direction. Minimum slewing speed = (slope) (10 in./sec) = 20 in./sec (slope) (25.4 cm/sec) = 50 cm/sec for 7044B Model. Minimum slewing speed = (slope) (10 in./sec) = 30 in./sec (slope) (25.4 cm/sec) = 76 cm/sec for the 7045B Model.

5-55. X-AXIS SLEWING SPEED.

5-56. Before performing this procedure, exchange sources to X and Y axis inputs. Connect Function Generator to Y-axis and Power Supply to X-axis.

- Set X- and Y-axis RANGE switches to 100 mV/in. (50 mV/cm).
- Set Function Generator applied to Y axis to 0.5 Hz triangular wave output.

c. Open switch S1 on Power Supply. Set Power Supply for approximate output of 1.5 V.

d. Place pen on bottom grid line. Turn on LINE, CHART, SERVO, and PEN.

e. Set Function Generator on Y-axis for 10 inch (25 cm) peak-to-peak excursion.

f. At center of Y-axis travel, close S1 switch. After arm has slewed to full scale, position SERVO toggle switch to STANDBY. Plot in Figure 5-14 indicates pen moves greater than 2 inches in Y direction for 1 inch movement in X-direction. Minimum slewing speed = (slope) (10 in./sec) = 20 in./sec (slope) (25.4 cm/sec) = 50 cm/sec for the 7044B Model. For the 7045B (slope) (10 in./sec) = 30 in./sec (slope) (25.4 cm/sec) = 76 cm/sec minimum slewing speed.

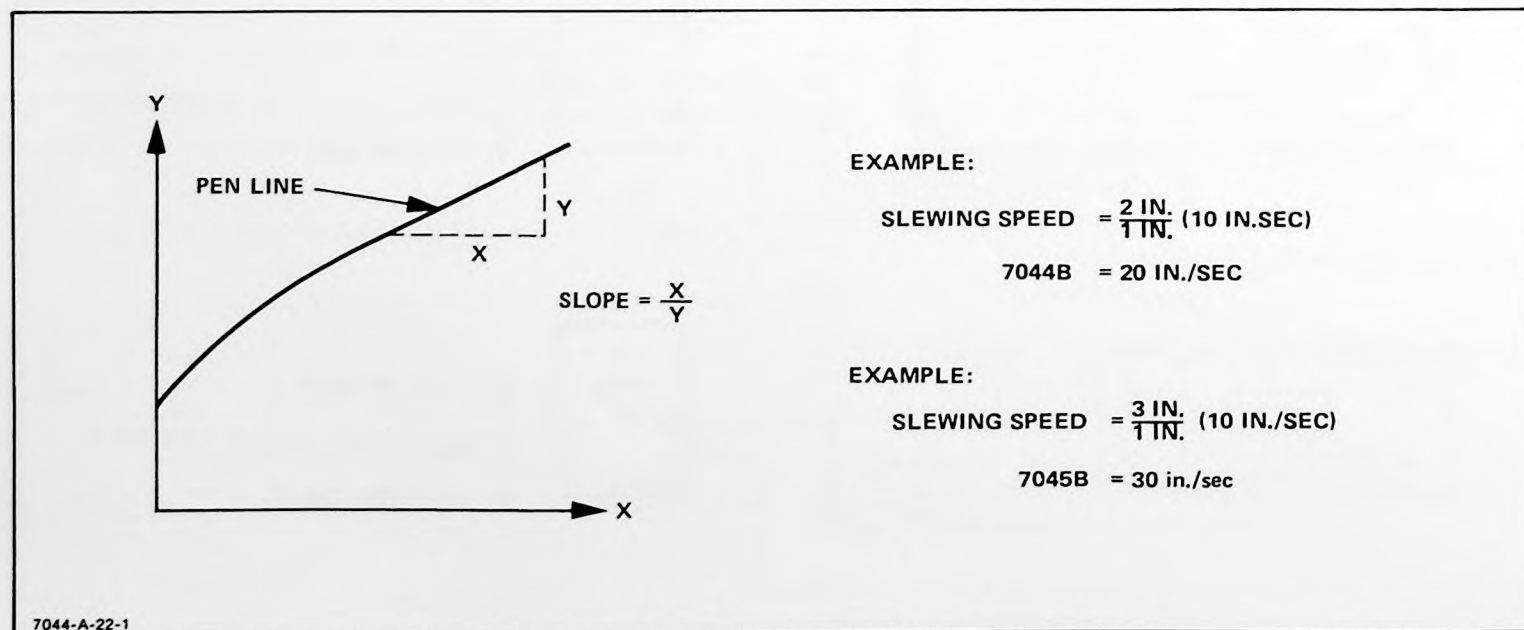


Figure 5-14. X-Axis Slewing Speed — 7044B and 7045B Models

5-57. COMMON MODE REJECTION.

5-58. DC CMR.

- Connect 1k resistor between HI and LO input terminals on both axes.
- Connect DC Standard between X-axis LO input terminal and ground.
- Set X-axis RANGE switch to 0.5 mV/inch.
- Set DC Standard to 500V.
- Pen deflection shall not exceed 3.2 inches (6.4 cm) with pen at any position on paper.
- Repeat test for Y-axis. Pen deflection same as X-axis.

5-59. AC CMR.

- Connect 1k resistor between HI and LO input terminals on both axes.
- Connect Function Generator between LO terminal of X-axis and ground. Connect multifunction meter to output of Function Generator.
- Set X-axis RANGE switch to 0.5 mV/inch.
- Set Function Generator to 10.5 V RMS (30 V p-p) 60 Hz sine wave.
- Pen deflection shall not exceed 1.9 inches (3.8 cm) with pen at any position on paper.
- Repeat test for Y-axis. Pen deflection same as X-axis.

5-60. OVERSHOOT.

5-61. To check the X-axis overshoot, first make the connections as shown in Figure 5-15.

- Set X- and Y-axis RANGE switches to 100 mV/in. (50 mV/cm).
- Set Function Generator 1 to 0.5 Hz, square wave, and amplitude to full counterclockwise.
- Set Function Generator 2 for a 0.5 Hz triangular wave and amplitude to full counterclockwise.
- Adjust amplitude on Function Generator 1 setting X-axis to approximately 7-inch span. Set Y-axis to span of 7 inches by adjusting amplitude on Function Generator 2.
- Place PEN toggle switch to RECORD. Y-axis moves 1/2 cycle. Lift pen.
- Max. X-axis overshoot: 7044A 0.3 in. (0.76 cm); 7045A 0.15 in. (0.38 cm).

5-62. To check the Y-axis overshoot, exchange Function Generator between X and Y axis. Perform procedure identical to paragraph 5-61, steps a through e. Maximum overshoot should be: 7044B 0.2 in. (0.51 cm); 7045B 0.1 in. (0.25 cm).

5-62A. 100 MILLISECOND SERVO DELAY.

5-62B. To perform this test, an HP 181A Oscilloscope, or equivalent, is required. Proceed as follows:

- Connect the input of the oscilloscope to the base of transistor Q4 on the TTL circuit board, and chassis ground.

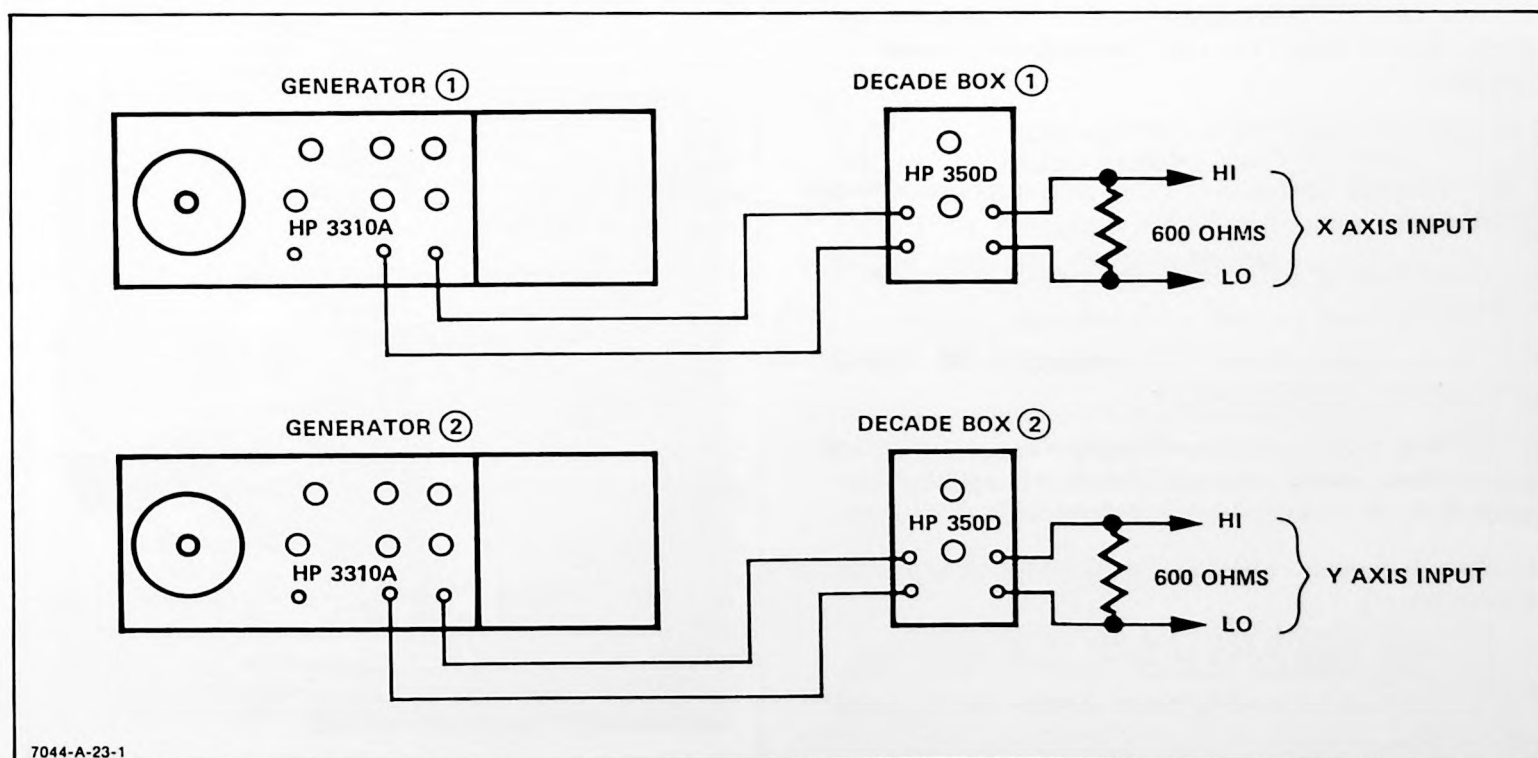


Figure 5-15. Overshoot Test Setup

b. Connect the trigger input to Pin 7 on the X-Y Recorder rear connector. Set the trigger input to DC.

c. Ground Pin 7 on the rear connector to chassis. The oscilloscope should indicate a pulse width of 100 milliseconds $\pm 20\%$.

5-63. TIME BASE – OPTION 001.

5-64. To check, perform the following steps:

- a. Remove bottom cover. See paragraph 5-18.
- b. Connect scope to SWEEP INDICATION (output from Rear Input Connector, Pin 29 referenced to ground, Pin 20).
- c. Using ZERO controls, place pen to far left of grid line.
- d. Place Time Base selector knob in X or Y position.
- e. Set TIME-SEC/IN. control knob to one of six sweep speeds.
- f. Place RESET/START toggle switch to START position. Pen should sweep across X or Y axis at correct speed. Monitor SWEEP INDICATION on scope for +5 level when sweeping.

NOTE

On the 7045B Model, the sweep will automatically be performed with the response slowed.

- g. Press RESET/START toggle switch to RESET. Pen should lift and return to original start position.
- h. Press RESET/START toggle switch to START. Pen should sweep full scale and automatically lift pen and return to zero position when sweep is completed at right hand stop.
- i. Run TIME-SEC/IN. control knob to remaining sweep speeds. Repeat steps f through i for each sweep speed selection.

5-65. EVENT MARKER – OPTION 002.

5-66. To verify operation of event marker, perform the following steps:

- a. Install Event Marker in provided plug-in slot at top of Y arm.
- b. Remove bottom cover. See paragraph 5-18. Turn on LINE, CHART, SERVO, and PEN.
- c. On Rear Connector, connect jumper between Pin 1 and ground. Event Marker pen should deflect sharply upward on the chart (Y direction) when activated.
- d. Remove jumper. Event Marker should return to original position.
- e. Place PEN toggle switch to LIFT. Event Marker pen should lift.

5-67. TTL.

5-68. To verify performance:

- a. Short input terminals.
- b. Turn on LINE and switch to FAST response if Model 7045B.
- c. Make connection between Pin 4 and Pin 20 (ground) to energize servos.
- d. X- and Y-axis servos unmuted (servo motors should drive pen to null).
- e. Place recording paper onto recording table. It should be easy to move paper in any direction.
- f. Connect jumper between Pin 3 and Pin 20 (ground) of J1 (Rear Input Connector). Chart paper should now be held firmly in place.
- g. Also make following TTL checks if Model 7045B:
 1. Connect jumper between Pin 5 and Pin 20 (ground) of Rear Input Connector.
 2. Grasp recording arm toward top and notice force required to move recording arm from null in either X direction. It should be rather easy to move and return to null rather slowly. Remove jumper from the Rear Input Connector and force and speed of the X arm should increase.
 3. Connect jumper between Pin 6 and Pin 20 (ground) of Rear Input Connector.
 4. Grasp metal portion of the pen holder and displace in either direction in Y axis. Force required to move from null should be minimal and speed of return to null rather slow. Remove jumper and force and speed of the Y axis should increase for fast response.

5-69. MECHANICAL ADJUSTMENTS.

5-70. PROCEDURE.

5-71. Any adjustments to the 7044B and 7045B is deemed necessary only when it is determined the models are out of adjustment per specifications, but not malfunctioning due to component failure.

5-72. Y-AXIS DRIVE STRING TENSION ADJUSTMENT.

5-73. The tension on the Y-axis string should be enough to stall the Y motor when the pen carriage is driven off-scale. If cable slips:

- a. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom paper guide. See paragraph 5-18.
- b. Move Y arm to access hold in frame.
- c. Insert Phillips POZIDRIV screwdriver through access hole from circuit board side of mainframe and loosen screw holding bottom Y arm pulley in place.
- d. Flip Y scale from over bottom pulley.
- e. Remove screw at bottom end of pen scale (0). Carefully remove Y slider rod to one side to allow clearance.

- f. Turn eccentric bottom pulley stud with wrench to tighten cable as required.
- g. Retighten screw on pulley stud.
- h. Recheck cable tension. If correct, install paper guide and realign X-axis (see paragraph 5-80).
- i. If not correct, repeat steps e, f, and g.
- j. Reassemble recorder.

5-74. X-AXIS CABLE TENSION ADJUSTMENT.

5-75. The X-axis cable tension should be verified by measuring the force required to displace it at a given distance. With the arm at the extreme right, pull up at the center of the center of the section of cable adjacent to the center of the X slider rod until it deflects 1/2 in. from relaxed position. The scale should be measured between 20 and 24 ounces for 7044B or 30 ± 2 ounces for a 7045B. See Figure 5-16. If the tension does not fall within these limits, loosen or tighten screw on X-axis slider block and perform Y-axis alignment, paragraph 5-82. See Figure 5-18.

5-76. Y GEAR TRAIN BACKLASH ADJUSTMENT.

5-77. The backlash of the pen gear drive system is adjusted as follows:

- a. Remove disposable pen. Remove rear hood, bottom cover, and platen. See paragraph 5-18. Remove pen lift bar. See paragraph 5-24 and Figure 5-4.

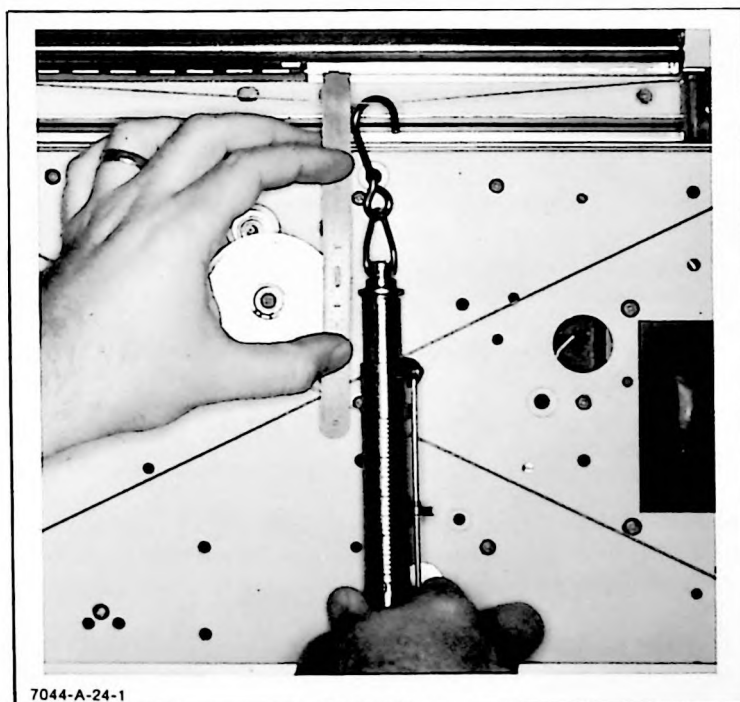


Figure 5-16. X-Axis Cable Tension Check

- b. Stand recorder on side (Y servo motor up). Slide carriage arm to extreme left.
- c. Loosen screw holding clamp to motor.
- d. Rotate motor slightly, first in one direction, then the other, until motor pinion rotates freely with minimum backlash.
- e. Tighten motor clamping screw. Recheck and repeat steps c and d if backlash is incorrect.
- f. Reassemble recorder.

5-78. X GEAR TRAIN BACKLASH.

5-79. Backlash of the gear drive system is adjusted as follows:

- a. Remove disposable pen. Remove Rear Hood, bottom cover, and platen. See paragraph 5-18.
- b. Loosen screw holding clamp to motor on 7044B instrument. On 7045B loosen two screws holding motor to casting.
- c. Rotate motor slightly until motor pinion rotates freely with minimum backlash.
- d. On 7044B, tighten motor clamping screw. Retighten two screws on 7045B.
- e. Recheck and repeat steps b and c if backlash is incorrect.
- f. Reassemble recorder.

5-80. X-AXIS ALIGNMENT ADJUSTMENT.

5-81. If the horizontal pen trace deviates from correctly aligned paper grid, adjust as follows:

- a. Remove disposable pen. Remove Rear Hood and platen. See paragraph 5-18.
- b. Loosen three Phillips screws holding paper stop bar after scribing ends of bar to index position. See Figure 5-17. Adjust bar, depending upon initial deviation of pen trace, forward or backward. Use scribed marks as reference.
- c. Tighten screws on paper stop.
- d. Replace platen (do not screw down). Place piece of chart paper on platen. Replace disposable pen. Make trace. If not aligned, repeat steps a, b, and c.
- e. When X-axis is correctly aligned, perform Y-axis alignment. See paragraph 5-82.

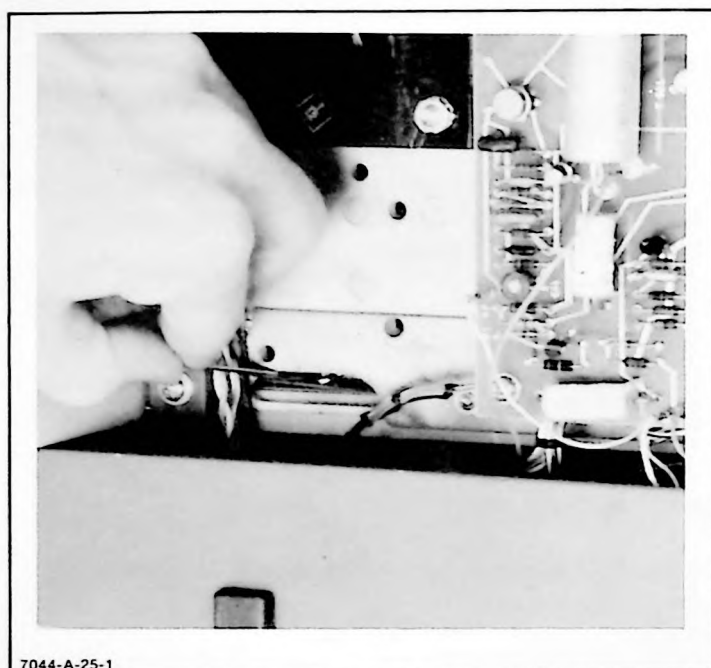


Figure 5-17. X-Axis Alignment Adjustment



Figure 5-18. Y-Axis Alignment Adjustment

5-82. Y-AXIS ALIGNMENT ADJUSTMENT.

5-83. If the vertical pen trace deviates from correctly aligned paper grids, but horizontal alignment is correct, proceed as follows:

- a. Remove disposable pen. Remove Rear Hood, bottom cover, and platen. See paragraph 5-18.
- b. Stand recorder on front side. Slide carriage to extreme right. Line up upper end of pen arm with access hole provided. See Figure 5-18. Rear of recorder at bottom of pen arm provides accessibility and visibility.
- c. Loosen large screw at top of slider block. Loosen nut clamping cable through provided hole. See Figure 5-18.
- d. Replace platen (do not screw down). Place piece of chart paper on platen. Replace disposable pen. Make trace. If not aligned, twist arm until trace is in exact alignment with recording paper.
- e. Tighten nut to clamp cable in position. Recheck alignment. If not exact, repeat step d.
- f. Remove platen. Tighten screw at top of arm. Slide arm back and forth checking for freedom. If binding, loosen screw again. Vibrate arm slightly to center slider bearing. Retighten screw and repeat until arm is free.
- g. Reassemble recorder.

5-84. PEN LIFT ADJUSTMENT.

5-85. Use the following procedure to align the pen lift:

- a. Remove disposable pen and top hood over lift mechanism.

- b. Pen lift solenoid assembly is mounted over left side of pen lift bar.

- c. Manually press solenoid closed and check clearance between plastic bumper on Y axis scale and pen lift bar. There should be clearance with the recording arm in any position. But if clearance is excessive, pen will not lift far enough off chart paper.

- d. To adjust, loosen two screws holding solenoid bracket and reposition until desired clearance is obtained. Tighten screws.

- e. Replace hood and disposable pen.

5-86. ELECTRICAL ADJUSTMENTS.**5-87. CALIBRATION ADJUSTMENT.**

5-88. Calibrate as follows:

- a. Remove bottom cover. See paragraph 5-18. Install chart paper and pen.
- b. Turn on LINE, CHART, SERVO, and PEN.
- c. Connect DC Standard to X-axis HI and LO input terminals. Adjust to 0 volts.
- d. Set X axis RANGE switch to 100 mV/in. (50 mV/cm).
- e. Position pen exactly at zero.
- f. Apply 1.5V to X input terminals; pen moves 15 in.(30 cm).
- g. Adjust CAL control (A3R22-7044B) (A3R24-7045B) on X-axis DC Amplifier Board. See Figure 5-19.

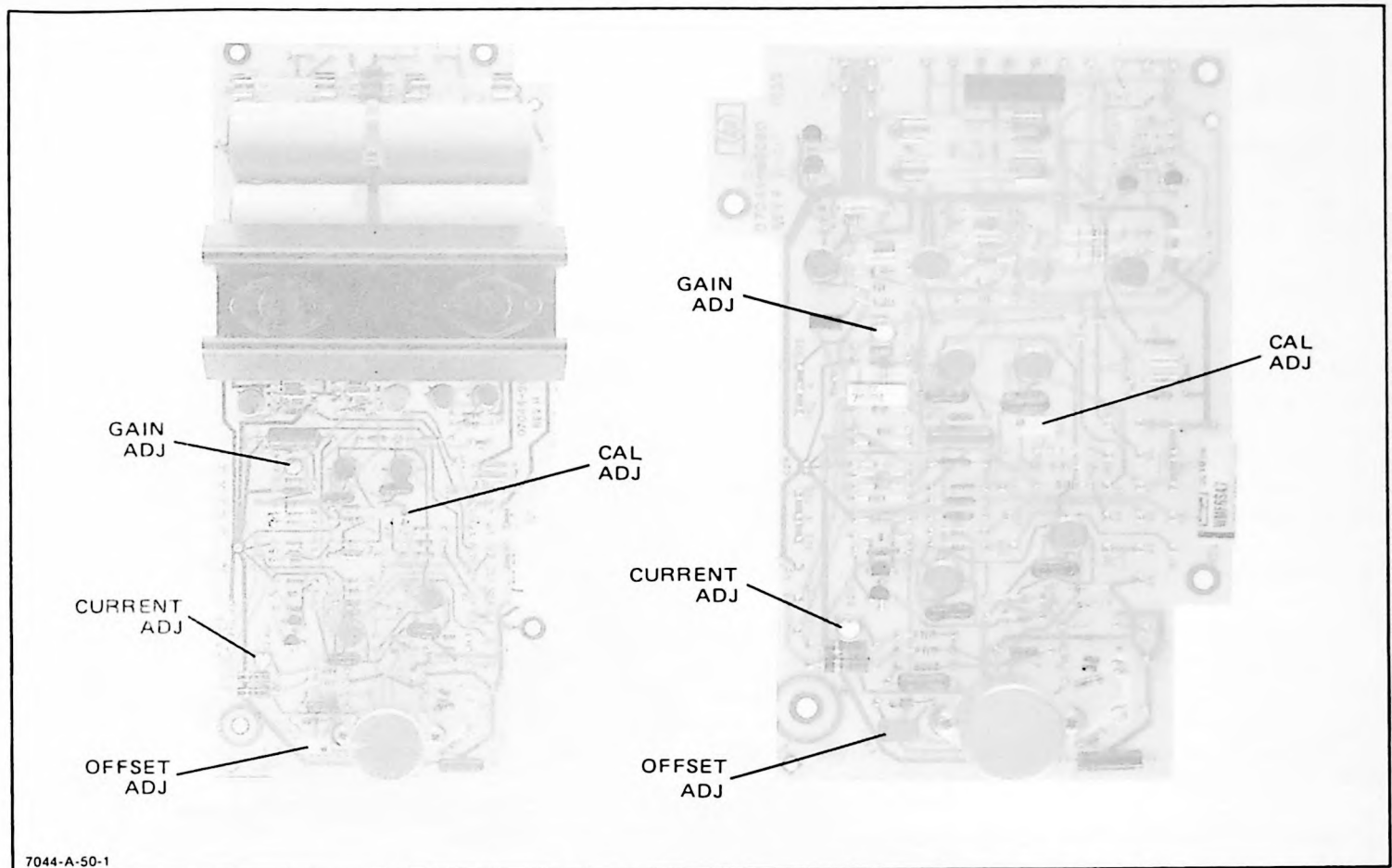


Figure 5-19. Calibration Adjustment

- h. Remove signal from X input terminals.
- i. Connect DC Standard to Y-axis HI and LO input terminals. Adjust to 0 volts.
- j. Set Y-axis RANGE switch to 100 mV/in. (50 mV/cm).
- k. Position pen exactly at zero.
- l. Apply 1V to Y input terminals; pen moves 10 in. (20 cm).
- m. Adjust CAL control (A2R22-7044B) (A2R26-7045B) on Y-axis DC Amplifier Board. See Figure 5-19.
- n. Remove DC Standard.

5-89. INPUT OFFSET ADJUSTMENT.

5-90. Perform the following adjustments:

- a. Remove bottom cover. See paragraph 5-18.
- b. Connect jumper between HI and LO input terminals of both axes. Position range switches on X and Y to 0.5 mV/in. (0.25 mV/cm). Position Time Base switch to OFF.
- c. On X-axis Amplifier Board, measure voltage between TP1 and circuit common using a Digital Voltmeter. Adjust potentiometer marked OFFSET until voltage is $0\text{ V} \pm 10\text{ mV}$. See Figure 5-19.

- d. Remove jumper from X-axis input terminals.

e. Adjust potentiometer marked I ADJ on X-axis Amplifier Board until voltage at TP1 returns to $0\text{ V} \pm 10\text{ mV}$. See Figure 5-19.

- f. Repeat same procedure for Y-axis.

5-91. GAIN ADJUSTMENT.

5-92. A potentiometer marked GAIN is provided on each Amplifier Board. Normal setting is in center of adjustment span. Increase gain by turning GAIN potentiometer clockwise. If servo oscillates, turn potentiometer counterclockwise to decrease amplifier gain. See Figure 5-19.

5-93. TIME BASE CALIBRATION ADJUSTMENT.

5-94. X-AXIS ADJUSTMENT. The calibration of the time base sweep option (Option 001) is established at the factory and should remain within specifications without recalibration. However, if adjustment is required to the X-axis due to deviation from the accuracy specifications, proceed as follows:

- a. Remove bottom cover. See paragraph 5-18.

- b. Install paper and pen.
- c. Turn on LINE and CHART.
- d. Place Time Base selector knob in X position.
- e. Set SWEEP RATE control knob to one of six sweep speeds. RESET/START toggle switch in START position.
- f. Turn on SERVO and PEN.
- g. Place RESET/START toggle switch to START position. Measure elapsed time for a 15-inch (38 cm) sweep. (Use stop watch for slow sweep speeds, or Time Mark Generator with better than $\pm 1\%$ accuracy applied to the other axis for faster sweep speeds.) Table 5-2 contains the correct elapsed time for each selected sweep speed; English and Metric. Do not adjust unless over 1% error.
- h. Compute error ratio:

$$\text{Error Ratio} = \frac{\text{Measured Sweep Time}}{\text{Correct Sweep Time}}$$

- i. Measure dc voltage at Test Point 1 on Time Base Board with digital voltmeter.

- j. Multiply error ratio times voltage measurement made in step k. The resultant is the correction voltage.

$$\text{Correction Voltage} = (\text{Error Ratio}) (\text{Voltage Measured})$$

- k. Adjust sweep calibration until digital voltmeter reads correction voltage. Sweep speed is now adjusted. As an example:

1. Position TIME-SEC/IN. control knob to 10 sec/in. sweep speed.

2. Elapsed time for 15 inch sweep was measured as exactly 147 seconds.

$$\begin{aligned} 3. \text{ Correct Sweep Time} &= (\text{Sweep Speed}) (\text{Length of Axis}) \\ &= (10 \text{ sec/in.}) (15 \text{ in.}) \\ &= 150 \text{ seconds.} \end{aligned}$$

$$\begin{aligned} 4. \text{ Error Ratio} &= \frac{\text{Measured Sweep Time}}{\text{Correct Sweep Time}} \\ &= \frac{147 \text{ seconds}}{150 \text{ seconds}} \\ &= 0.98 \end{aligned}$$

5. Voltage measured at Test Point 1 on Time Base Board with digital voltmeter is 1.055 volts.

$$\begin{aligned} 6. \text{ Correction Voltage} &= (\text{Error Ratio}) (\text{Voltage Measured}) \\ &= (0.98) (1.055 \text{ volts}) \\ &= 1.033 \text{ volts.} \end{aligned}$$

7. Adjust sweep speed calibration at Test Point 1 on Time Base Board until reading is 1.033 volts.

8. Sweep speed is now adjusted.

5-95. Y-AXIS ADJUSTMENT. To adjust the Y-axis, proceed as follows:

- a. Connect Time Mark Generator to X-axis input terminals. Set control knob to 1 sec/pulse.
- b. Place Time Base selector knob in Y position.
- c. Position X-axis RANGE switch to 10 V/inch.
- d. Position SWEEP RATE control knob to 1 sec/in. (5 sec/cm).

TABLE 5-2. TIME BASE CALIBRATION REQUIREMENTS

SWEEP SPEED (SECONDS/INCH)	ELAPSED TIME FOR 15 IN. SWEEP (SECONDS)	MAXIMUM DEVIATION (SECONDS)
0.5	7.5	± 0.075
1	15	± 0.15
2	30	± 0.30
5	75	± 0.75
10	150	± 1.5
20	300	± 3.0
50	750	± 7.5
100	1500	± 15.0
SWEEP SPEED (SECONDS/CENTIMETER)	ELAPSED TIME FOR 38 CM SWEEP (SECONDS)	MAXIMUM DEVIATION (SECONDS)
0.25	9.5	± 0.095
0.5	19	± 0.19
1	38	± 0.38
2.5	95	± 0.95
5	190	± 1.9
10	380	± 3.8
25	950	± 9.5
50	1900	± 19.0

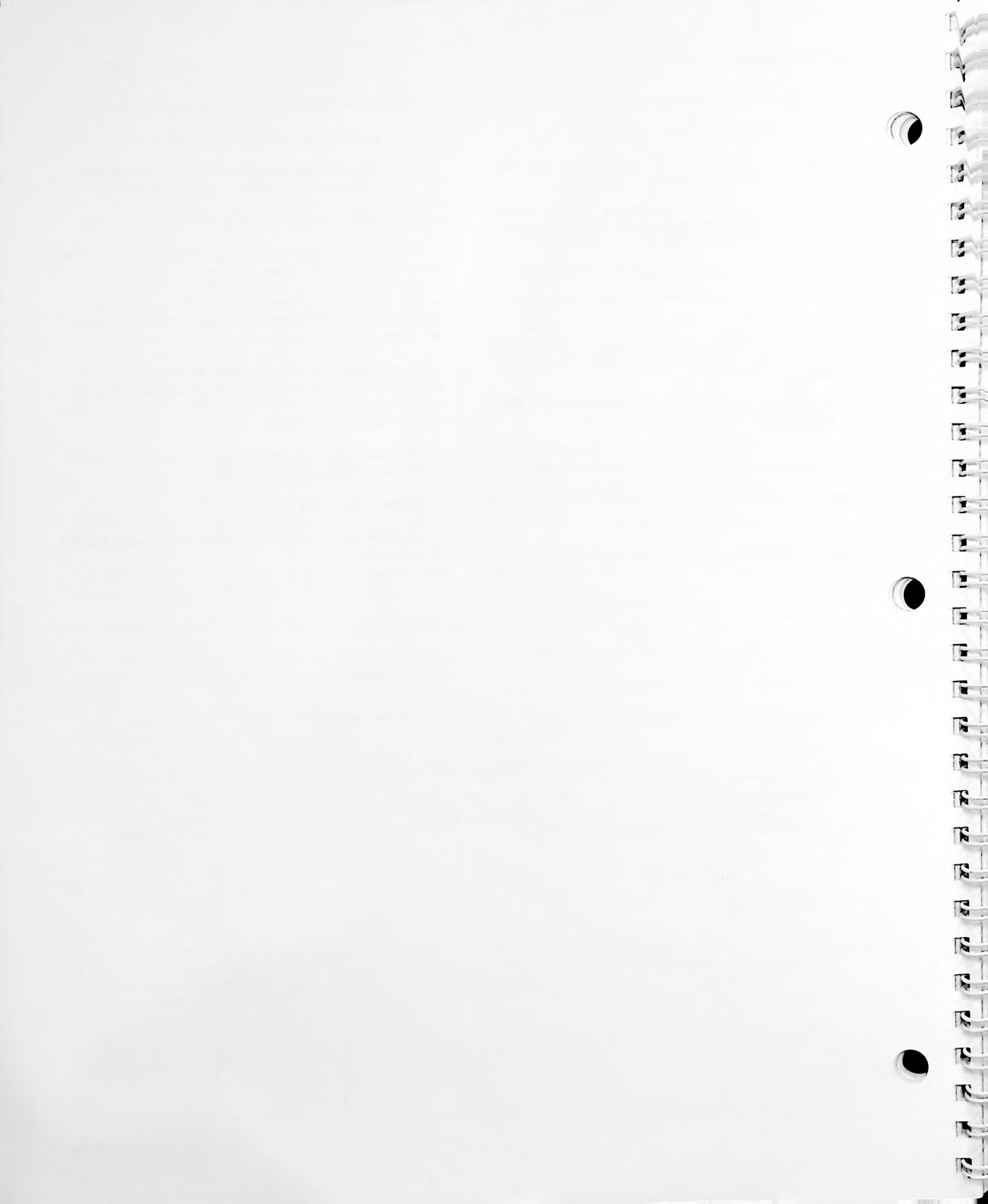
- e. Zero pen at lower (Y-axis zero) grid line.
- f. RESET/START toggle switch in START position.
- g. Obtain plot of 1 second pulses along Y-axis. Make first pulse occur as close as possible to Y-axis zero grid line.
- h. Measure distance between leading (or trailing) edges of first and tenth pulse. This distance will be approximately $8\frac{1}{2}$ to $9\frac{1}{2}$ inches (17 to 19 cm).
- i. Subtract distance measured from 18 inches (36 cm).
- j. Disconnect Time Mark Generator. Start Time Base.
- k. Pen will be stopped at 9 inches (18 cm) by pulling white/violet wire off Test Point 1 when pen reaches exactly 9 inches (18 cm). Use SWEEP RATE knob to slow sweep as pen nears 9 inches.
- l. Using Y CAL potentiometer on Time Base Circuit Board, set pen at distance acquired from step i.
- m. Reconnect white/violet wire and recheck sweep calibration in Y-axis. Repeat steps h through l, if necessary.

5-96. Y-AXIS LIMIT SWITCH ADJUSTMENT – 7045B.

5-97. To perform the adjustment:

- a. Remove bottom cover. See paragraph 5-18.

- b. Place LINE toggle switch to ON position.
- c. Place paper on table. Turn on CHART and PEN.
- d. Manually move pen to uppermost Y position possible and draw a horizontal line (this is mechanical limit).
- e. Place SERVO toggle switch to ON.
- f. Using Y-axis ZERO control, bring pen to about 1 inch from upper Y grid boundary of paper.
- g. By slowly turning Y-axis ZERO control, bring pen to uppermost Y position possible and draw another horizontal line (this is electrical limit line).
- h. If this line is not approximately midway between mechanical limit line and upper Y grid boundary of paper, return pen to 1 inch from upper Y grid boundary of paper using Y-axis ZERO control.
- i. On Y-axis Amplifier Board, adjust A2R38 (clockwise for down, counterclockwise for up).
- j. Repeat steps g and h.
- k. Perform above procedure for lower limit using A2R36 for adjustment.



SECTION VI

PARTS LIST

6-1. INTRODUCTION.

6-2. This section contains complete information on the 7044B and 7045B Chassis and Miscellaneous parts list. The procedure for ordering replacement parts for either recorder is also contained in this section.

6-3. CHASSIS PARTS.

6-4. Chassis mounted parts for the model 7044B are identified in Figures 6-1 and 6-2 and listed in Tables 6-1 and 6-2. The Model 7045B chassis mounted parts are identified in Figures 6-3 and 6-4 and listed in Tables 6-5 and 6-6. The above mentioned tables include, HP part numbers, part quantity, (total quantity appears the first time the HP part number appears), a five-digit manufacturer's code and the manufacturer's part number.

6-5. MISCELLANEOUS PARTS.

6-6. Tables 6-3 and 6-7 list those miscellaneous items not covered in the preceding tables. The items for each model will be listed by a part number, description and quantity.

6-7. CODE LIST OF MANUFACTURERS.

6-8. Table 6-10 lists the five-digit code numbers assigned to a specific manufacturer. These code numbers appear in Tables 6-1, 6-2, 6-5 and 6-6.

6-9. RECOMMENDED SPARES.

6-10. Tables 6-4 (7044B) and 6-8 (7045B) provide a listing for all components with mortality experience. Recommended quantities to stock for maintaining the models for a one-year period will be specified in the Quantity column.

6-11. ORDERING INFORMATION.

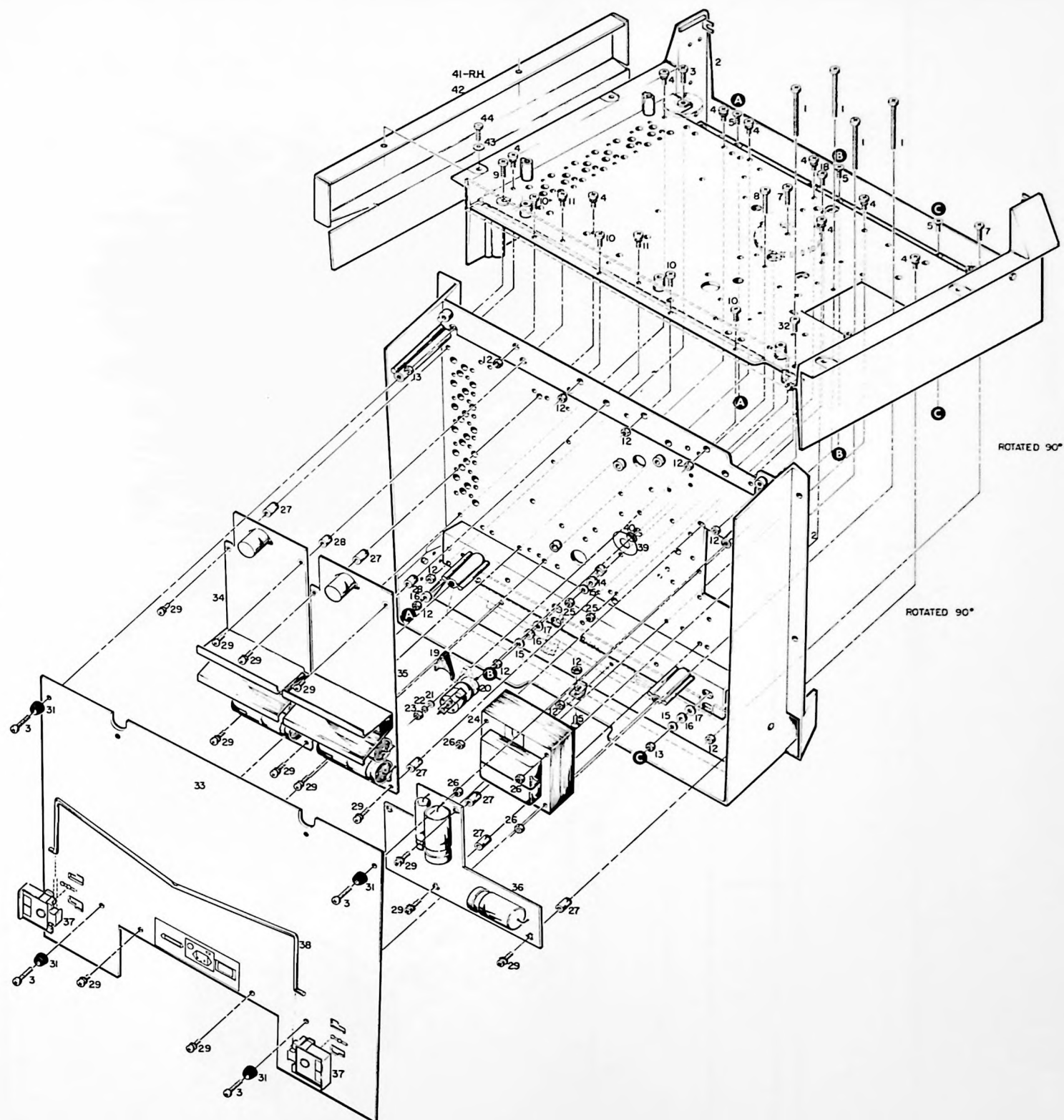
6-12. To obtain replacement parts, address order or inquiry to your local Hewlett-Packard Sales/Service Office (see insert pages at rear of manual for address of nearest HP office). The order should include part number and description used in this section, model and serial number, description of the part, and function and location of the part.

6-13. ABBREVIATIONS.

6-14. Table 6-9 lists abbreviations used through the manual. Abbreviations in the Parts List are always all capital letters, in other parts of the manual both upper and lower case abbreviations are used.

Table 6-1. Main Frame Assembly – Model 7044B (Sheet 1 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	2510-0142	6	4	SCREW=MACH 8-32 2.125-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
2	07040-60580	5	1	CASTING=MAIN FRAME	28480	07040-60580
3	2510-0107	3	1	SCREW=MACH 8-32 .5-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
4	2360-0121	2	14	SCREW=MACH 6-32 .5-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
5	2360-0183	5	5	SCREW=MACH 6-32 .375-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
6				NOT ASSIGNED		
7	2510-0141	5	1	SCREW=MACH 8-32 .562-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
8	2360-0205	3	1	SCREW=MACH 6-32 .75-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
9	2510-0111	9	3	SCREW=MACH 8-32 .75-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
10	2360-0201	9	8	SCREW=MACH 6-32 .5-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
11	2360-0121	2		SCREW=MACH 6-32 .5-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
12	0590-0381	1	1	NUT=HEX=H/LKRR 6-32=THD .12-IN=THK	00000	ORDER BY DESCRIPTION
13	2580-0006	8	1	NUT=HEX=H/LKRR 8-32=THD .125-IN=THK	00000	ORDER BY DESCRIPTION
14	07040-21020	6	1	WASHER=8=BOULDERED	28480	07040-21020
15	3050-0399	0	11	WASHER=FL MTLC NO. 6 .143-IN-ID	28480	3050-0399
16	1200-0092	7	3	INSULATOR=XSTR NYLON	28480	1200-0092
17	3050-0392	3	2	WASHER=FL MTLC 1/4 IN .26-IN-ID	28480	3050-0392
18	2360-0121	2		SCREW=MACH 6-32 .5-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
19	07040-40040	0	1	CLAMP=SERVO MOTOR, X-AXIS	28480	07040-40040
20	5060-6608	9	1	SERVO MOTOR Y-AXIS	28480	5060-6608
21	3050-0393	4	1	WASHER=FL MTLC NO. 5 .13-IN-ID	28480	3050-0393
22	2190-0105	1	4	WASHER=LK MLCL NO. 6 .141-IN-ID	28480	2190-0105
23	2420-0016	2	4	NUT=HEX=OBL=CHAM 6-32=THD .062-IN=THK	00000	ORDER BY DESCRIPTION
24	07044-60510	5	1	TRANSFORMER=POWER	28480	07044-60510
25	2420-0003	7	5	NUT=HEX=OBL=CHAM 6-32=THD .094-IN=THK	00000	ORDER BY DESCRIPTION
26	2580-0006	8		NUT=HEX=H/LKRR 8-32=THD .125-IN=THK	00000	ORDER BY DESCRIPTION
27	0380-0310	1	10	STANDOFF=RVY=ON .75-IN-LG 6-32THD	00000	ORDER BY DESCRIPTION
28	0380-0771	8	2	STANDOFF=RVY=ON .625-IN-LG 6-32THD	28480	0380-0771
29	2360-0119	8	18	SCREW=MACH 6-32 .438-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
30				NOT ASSIGNED		
31	4003-0303	8	4		28480	4003-0303
32	2510-0111	9		SCREW=MACH 8-32 .75-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
33	07044-00908	9	4	COVER=BOTTOM	28480	07044-00908
34	07044-60500	3	1	Y-AXIS AMPLIFIER PCA (STD)	28480	07044-60500
	07044-60580	9		Y-AXIS AMPLIFIER PCA (METRIC)	28480	07044-60580
35	07044-60100	9	1	X-AXIS AMPLIFIER PCA (STD.)	28480	07044-60100
	07044-60590	1		X-AXIS AMPLIFIER PCA (METRIC)	28480	07044-60590
36	07044-60200	0	1	POWER SUPPLY PCA	28480	07044-60200
37	5060-0767	9	2	FOOT ASSY:FM	28480	5060-0767
38	1490-0030	6	1	TILT STAND 3-IN=H 13.75-IN=OA=LG SST	28480	1490-0030
39	3050-0913	4	1	WASHER=FL NM 1/2 IN .526-IN-ID	28480	3050-0913
40	07040-20075	9	1	BUSHING=X-AXIS MOTOR	28480	07040-20075
41	07040-00417	1	1	SIDE TRIM=R,H.	28480	07040-00417
42	07044-00416	4	1	SIDE TRIM=L,H.	28480	07044-00416
43	3050-0386	5	4	WASHER=8=FLDR 1/4 IN .25-IN-ID .5-IN=OD	28480	3050-0386
44	2510-0020	9	4	SCREW=MACH 8-32 .375-IN-LG TR=HD=PHL	00000	ORDER BY DESCRIPTION

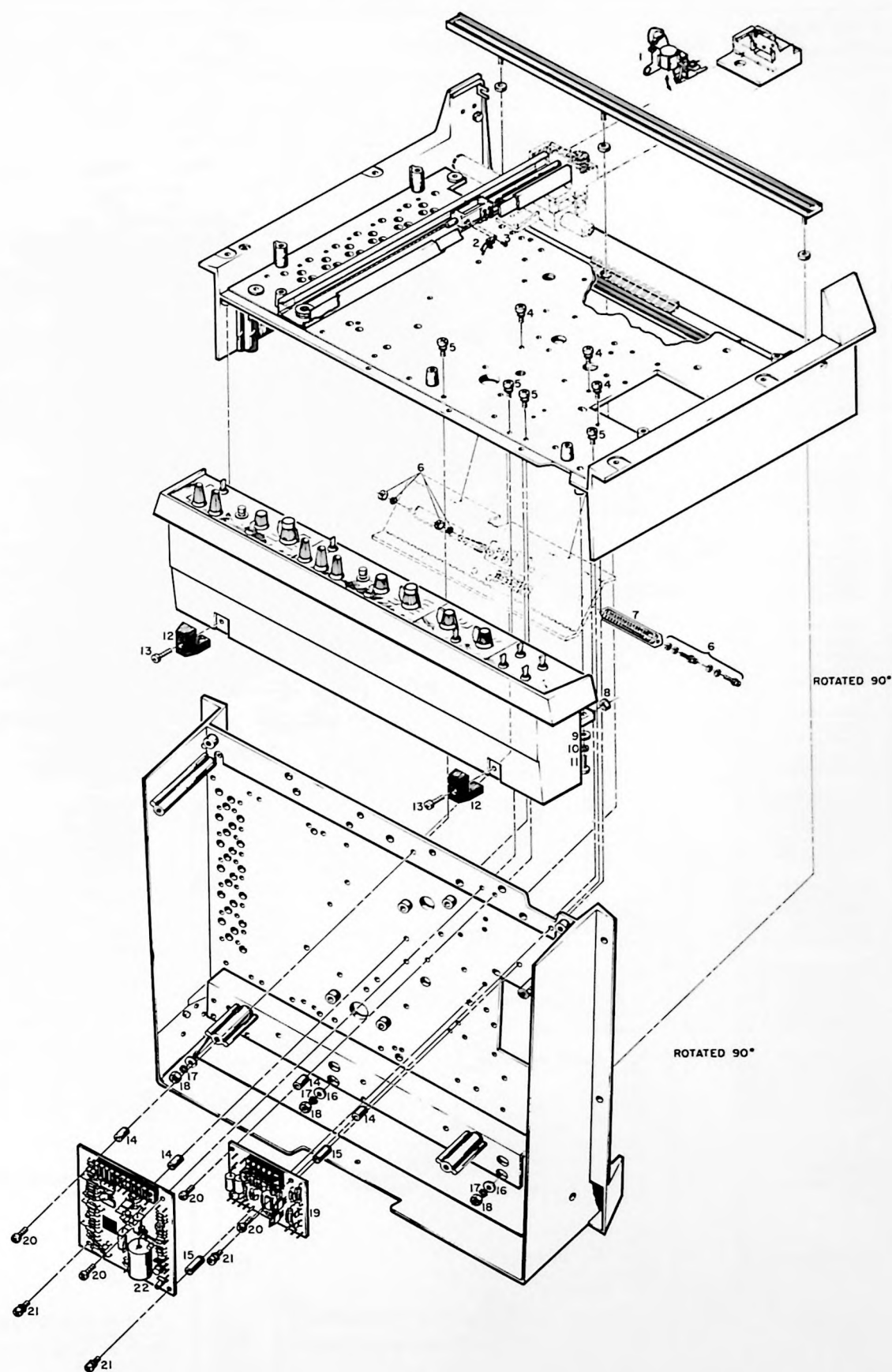


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Figure 6-1. Main Frame — Model 7044B (Sheet 1 of 3)

Table 6-1. Main Frame Assembly — Model 7044B (Sheet 2 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	07040-60918	3	1	EVENT MARKER ASSY (UPT. 002)	28480	07040-60918
2	07040-60441	7	2	WIPER ASSEMBLY-Y-AXIS (RETRANS. POT.)	28480	07040-60441
3	0516-0004	9	4	SCREW-MACH 0-80 .125-IN-LG PAN-HD-SLT	00000	ORDER BY DESCRIPTION
4	2360-0117	6	3	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
5	2360-0118	7	4	SCREW-MACH 6-32 .375-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
6	1251-0218	6	2	LOCK-SUBMIN D CONN	28480	1251-0218
7	1251-3162	5	1	CONNECTOR 37-PIN F AMPHENOL 17	28480	1251-3162
8	0510-0195	7	2	NUT-HEX-MET LKG 6-32-THD .172-IN-THK	28480	0510-0195
9	3050-0399	0	5	WASHER-FL MTLC NO. 6 .143-IN-ID	28480	3050-0399
10	2190-0007	2	5	WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
11	2360-0203	1	2	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
12	0403-0190	5	2	FOOT-RUBBER, .29000, .093DP, .156DIA THRU	28480	0403-0190
13	2360-0085	7	4	SCREW-MACH 6-32 .562-IN-LG TR-HD-PHL	00000	ORDER BY DESCRIPTION
14	0380-0111	0	4	STANDOFF-RVT-ON .25-IN-LG 6-32THD	00000	ORDER BY DESCRIPTION
15	0380-0156	3	2	STANDOFF-RVT-ON .375-IN-LG 6-32THD	00000	ORDER BY DESCRIPTION
16	3050-0399	0		WASHER-FL MTLC NO. 6 .143-IN-ID	28480	3050-0399
17	2190-0007	2		WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
18	2420-0010	6	3	NUT-HEX-DBL-CHAM 6-32-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
19	07044-60301	2	1	PCA-TTL CONTROL	28480	07044-60301
20	2360-0191	6	4	SCREW-MACH 6-32 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
21	2360-0113	2	3	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
22	07044-60400	2	1	PCA-TIME BASE	28480	07044-60400
23	1251-3122	7	37	CONTACT-CONN U/M-AMPH-17 FEM CRP	28480	1251-3122



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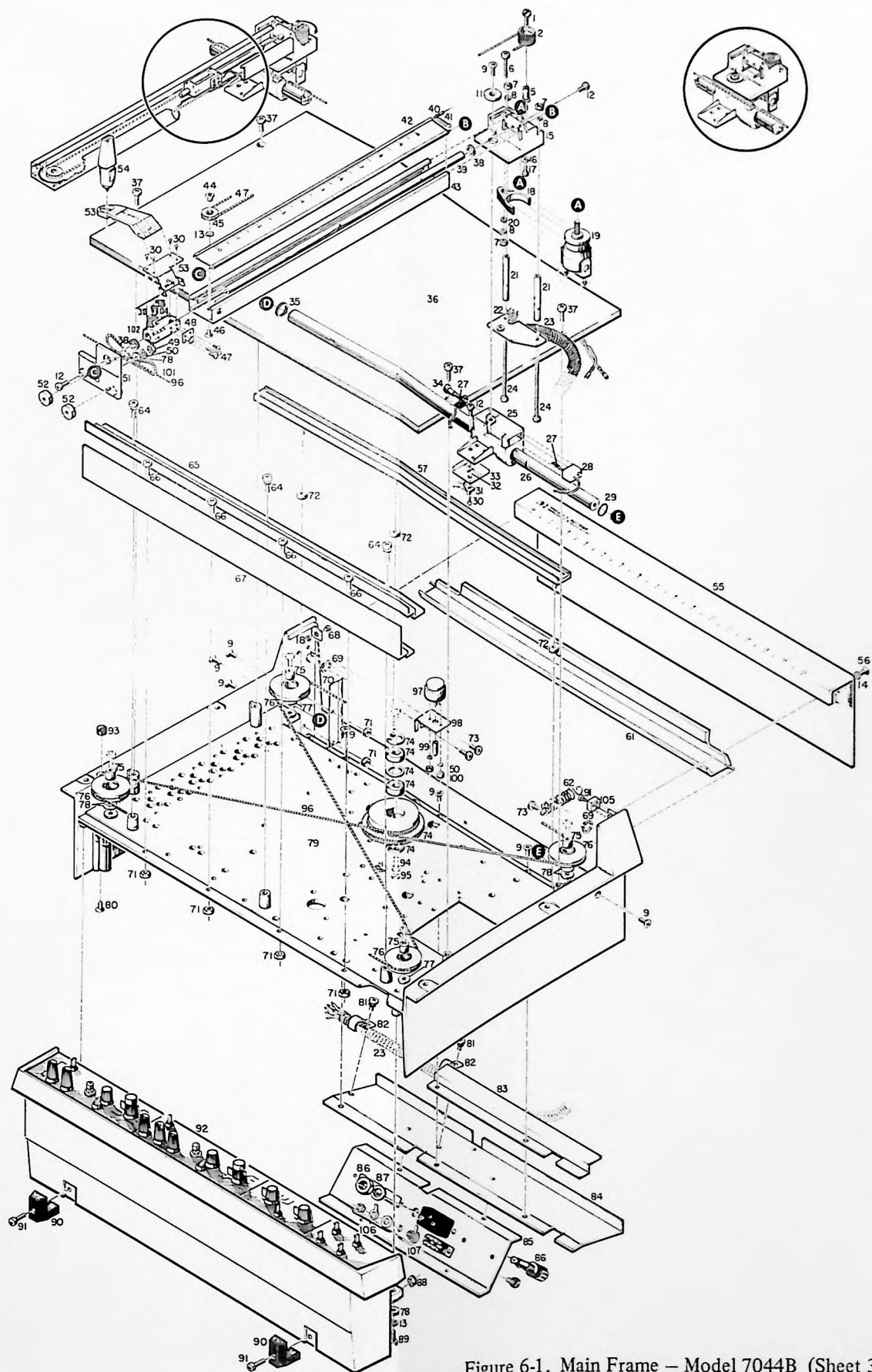
Figure 6-1. Main Frame — Model 7044B (Sheet 2 of 3)

Table 6-1. Main Frame Assembly — Model 7044B (Sheet 3 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	0570-0125	9	1	SCREW=MACH 4-40 .188-IN-LG BDC=HD=SLT	00000	ORDER BY DESCRIPTION
2	07040-60551	0	1	GEAR DRIVE-Y=AXIS	28480	07040-60551
3				NOT ASSIGNED		
4				NOT ASSIGNED		
5	07040-20730	3	1	RETAINER-Y=AXIS GEAR DRIVE	28480	07040-20730
6	2360-0207	5	1	SCREW=MACH 6-32 .875-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
7	2420-0016	2	3	NUT=HEX=DBL-CHAN 6-32-THD .062-IN=THK	00000	ORDER BY DESCRIPTION
8	2190-0105	1	1	WASHER=LK HLCL NO. 6 .141-IN-ID	28480	2190-0105
9	2360-0183	6	5	SCREW=MACH 6-32 .375-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
10				NOT ASSIGNED		
11	07040-20600	6	1	WASHER=MOTOR BLOCK	28480	07040-20600
12	2360-0420	4	2	SCREW=MACH 6-32 .312-IN-LG TR=HD=POZI	00000	ORDER BY DESCRIPTION
13	2190-0007	2	2	WASHER=LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
14	3050-0388	7	2	WASHER=FL NM NO. 6 .14-IN-ID .312-IN-OD	28480	3050-0388
15	07040-60830	8	1	MOTOR BLOCK-Y=ARM	28480	07040-60830
16	2190-0108	4	2	WASHER=LK HLCL NO. 4 .115-IN-ID	28480	2190-0108
17	2200-0141	8	1	SCREW=MACH 4-40 .312-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
18	07040-40040	0	1	CLAMP=SERVO MOTOR	28480	07040-40040
19	5060-6608	9	1	SERVO MOTOR, Y-AXIS	28480	5060-6608
20	2190-0876	3	1	WASHER=FL MTLC NO. 6 .141-IN-ID	28480	2190-0876
21	07040-20950	9	2	STANDOFF=CABLE	28480	07040-20950
22	07040-00200	0	1	BRACKET=TRAILING CABLE	28480	07040-00200
23	1460-1248	7	1	SPRING=EXT .312-IN-OD 16-IN-0A=LG MUW	28480	1460-1248
24	2360-0221	3	2	SCREW=MACH 6-32 2.5-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
25	07040-60670	4	1	SLIDER BLOCK=X=AXIS	28480	07040-60670
26	07040-20620	0	1	SLIDER ROD=X=AXIS	28480	07040-20620
27	0362-0191	8	1	SLEEVE=METAL .125-OD BRS .07-ID .281-LG	28480	0362-0191
28	07040-40020	6	1	TIGHTENER=CABLE	28480	07040-40020
29	0905-0442	4	2	O-RING .489-IN-ID .07-IN=XSECT=DIA NTRL	28480	0905-0442
30	0516-0005	0	6	SCREW=MACH 0-80 .188-IN-LG PAN=HD=SLT	00000	ORDER BY DESCRIPTION
31	5080-8117	1	1	WIPER ASSY	28480	5080-8117
32	0510-0198	0	1	NUT=HEX=DBL-CHAN 0-80-THD .047-IN=THK	00000	ORDER BY DESCRIPTION
33	07040-60680	6	1	WIPER BLOCK	28480	07040-60680
34	2360-0318	9	1	SCREW=MACH 6-32 1.875-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
35	07040-00020	2	1	BUMPER=X=AXIS SLIDER BLOCK	28480	07040-00020
36	07040-60520	3	1	AUTOGRIP PLATEN	28480	07040-60520
37	2360-0201	9	8	SCREW=MACH 6-32 .5-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
38	0905-0363	8	2	O-RING .239-IN-ID .067-IN=XSECT=DIA NTRL	28480	0905-0363
39	07040-20560	7	1	SLIDER ROD=Y=AXIS	28480	07040-20560
40	07040-20240	0	1	BUMPER=PEN LIFT	28480	07040-20240
41	1460-1253	4	1	SPRING=EXT .095-IN-OD MUW OIL CTD	28480	1460-1253
42	07040-60916	1	1	SCALE=Y=AXIS (ENGLISH)	28480	07040-60916
	07040-60917	2	1	SCALE=Y=AXIS (METRIC)	28480	07040-60917
43	07040-60550	9	1	SLIDEWIRE ASSEMBLY=Y=AXIS	28480	07040-60550
44	07040-20160	3	1	PULLEY STUD	28480	07040-20160
45	07040-60370	1	1	PULLEY IDLER=Y=AXIS	28480	07040-60370
46	2200-0164	5	1	SCREW=MACH 4-40 .188-IN-LG UNCT 82 DEG	00000	ORDER BY DESCRIPTION
47	07040-60913	8	1	CABLE ASSEMBLY=Y=AXIS	28480	07040-60913
48	07040-00290	8	1	BRACKET=CABLE	28480	07040-00290
49	0590-0199	9	1	NUT=HEX=H/LKRR 4-40-THD .094-IN=THK	00000	ORDER BY DESCRIPTION
50	2190-0031	2	2	WASHER=LK INTL T NO. 3 .102-IN-ID	28480	2190-0031
51	07040-40080	8	1	CAP=END	28480	07040-40080
52	07040-20610	8	2	WHEEL=END CAP	28480	07040-20610
53	07041-60001	6	1	PEN HOLDER ASSEMBLY	28480	07041-60001
54	5081-1190	8	1	KEY CAP	28480	5081-1190
	5081-1191	9		KEY CAP	28480	5081-1191
	5081-1192	0		KEY CAP	28480	5081-1192
	5081-1193	1		KEY CAP	28480	5081-1193
55	07044-00909	0	1	REAR HOOD ASSEMBLY (ENGLISH)	28480	07044-00909
	07044-00910	3		REAR HOOD ASSEMBLY (METRIC)	28480	07044-00910
56	2430-0004	9	2	SCREW=MACH 6-32 .5-IN-LG TR=HD=PHL	00000	ORDER BY DESCRIPTION
57	07040-60570	3	1	SLIDEWIRE ASSEMBLY=X=AXIS (19.2K)	28480	07040-60570
58				NOT ASSIGNED		
59				NOT ASSIGNED		
60				NOT ASSIGNED		
61	07040-60030	0	1	PEN LIFT ASSEMBLY	28480	07040-60030
62	1460-1252	3	1	SPRING=EXT .31-IN-OD MUW	28480	1460-1252
63				NOT ASSIGNED		
64	2360-1117	6	3	SCREW=MACH 6-32 .375-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
65	07040-20650	6	1	PAPER STOP	28480	07040-20650
66	2360-0199	4	4	SCREW=MACH 6-32 .438-IN-LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
67	07040-20670	0	1	Y=ARM SUPPORT	28480	07040-20670
68	07040-20200	2	2	NUT=HOOD	28480	07040-20200
	2450-0072	3		NUT=HEX=DBL-CHAN 1/4-32-THD .062-IN=THK	00000	ORDER BY DESCRIPTION

Table 6-1. Main Frame Assembly — Model 7044B (Sheet 4 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
69	1600-0065	2	2	RETAINER C-RING	28480	1600-0065
70	07040-00210	2	1	WIRE GUIDE	28480	07040-00210
71	0590-0381	1	6	NUT-HEX-M/LKRR 6-32-THD .12-IN-THK	00000	ORDER BY DESCRIPTION
72	1200-0092	7	3	INSULATOR-XSTR NYLON	28480	1200-0092
73	0624-0206	2	3	SCREW-TPG 6-32 .25-IN-LG PAN-HD-POZI STL	28480	0624-0206
74	07040-60710	3	1	DRIVE GEAR ASSEMBLY	28480	07040-60710
75	07040-20520	9	4	SLEEVE-IDLER PULLEY	28480	07040-20520
76	07040-60217	5	1	IDLER PULLEY	28480	07040-60217
77	2190-0151	7	2	WASHER-FL MTLC NO. 8 .174-IN-ID	28480	2190-0151
78	3050-0139	6	10	WASHER-FL MTLC NO. 8 .172-IN-ID	28480	3050-0139
79	07040-60580	5	1	CASTING-MAINFRAME	28480	07040-60580
80	2200-0165	6	1	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
81	2360-0113	2	19	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
82	0510-0790	8	5	CABLE CLAMP-WFCL .312-DIA .312-ND STL	28480	0510-0790
83	07040-00140	7	1	GUARD-TRAILING CABLE ASSEMBLY	28480	07040-00140
84	07040-00050	8	1	GUIDE-TRAILING CABLE SPRING	28480	07040-00050
85	07044-60906	3	1	BRACKET ASSEMBLY- POWER	28480	07044-60906
86A	2110-0465	8	1	FUSEHOLDER CAP EXTR PST; BAYONET; 20A	28480	2110-0465
86B	2110-0470	5	1	FUSEHOLDER BODY EXTR PST; BAYONET; TND	75915	345003-010
86C	2110-0467	0	1	FUSEHOLDER COMPONENT HEX NUT; 1/2-28	28480	2110-0467
86D	2190-0152	8	1	WASHER-FL MTLC NO. 8 .188-IN-ID	28480	2190-0152
86E	2190-0152	8	2	WASHER-FL MTLC NO. 8 .188-IN-ID	28480	2190-0152
86F	2190-0452	1	1	WASHER-RECTANGULAR 0.140 IN ID; 0.516 IN	95987	06-140
	2110-0007	4	1	FUSE 1A 250V TO 1.25X.25 UL	75915	313001
	2110-0202	1	1	FUSE .5A 250V TO 1.25X.25 UL	75915	313.500
87	2190-0068	5	1	WASHER-LK INTL T 1/2 IN .505-IN-ID	28480	2190-0068
88	0510-0195	7	2	NUT-HEX-MET LKG 6-32-THD .172-IN-THK	28480	0510-0195
89	2360-0203	1	6	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
90	0403-0190	5	2	FOOT-RUBBER, .2900D, .093DP, .156DIA THRU	28480	0403-0190
91	2360-0085	7	2	SCREW-MACH 6-32 .562-IN-LG TR-HD-PHL	00000	ORDER BY DESCRIPTION
92	07040-21050	2	1	FRONT CASTING	28480	07040-21050
93	07040-20760	9	1	STOP-PAPER	28480	07040-20760
94	2360-0309	8	1	SCREW-MACH 6-32 PAN-HD-POZI	28480	2360-0309
95	3050-0766	5	1	WASHER-FL NM NO. 6 .14-IN-ID .5-IN-OD	28480	3050-0766
96	07040-60914	9	1	CABLE ASSEMBLY X-AXIS	28480	07040-60914
96	07044-60914	3	1	CABLE ASSEMBLY	28480	07044-60914
97	0491-0059	0	1	SOLENOID-RTRY	28480	0491-0059
98	07040-00240	8	1	BRACKET-SOLENOID ASSEMBLY	28480	07040-00240
99	07040-20870	2	1	PLUNGER END	28480	07040-20870
100	0615-0005	0	2	NUT; HEX 3-48 .062 X .188; SST; PSVT	28480	0615-0005
101				NOT ASSIGNED		
102	07040-20745	0	1	SLIDER BLOCK-Y-AXIS	28480	07040-20745
103				NOT ASSIGNED		
104	07040-60440	6	1	WIPER ASSEMBLY-Y-AXIS	28480	07040-60440
105*	07046-20002	8	2	HOOD-BLOCK	28480	07046-20002
106	1251-2101	0		JACK-BNA SINGLE RED SLDR-LUG-TERM	28480	1251-2101
107	1251-2102	1		JACK-BNA SINGLE BLK SLDR-LUG-TERM *INSTALLED AS NEEDED, NOT ON ALL RECORDER	28480	1251-2102

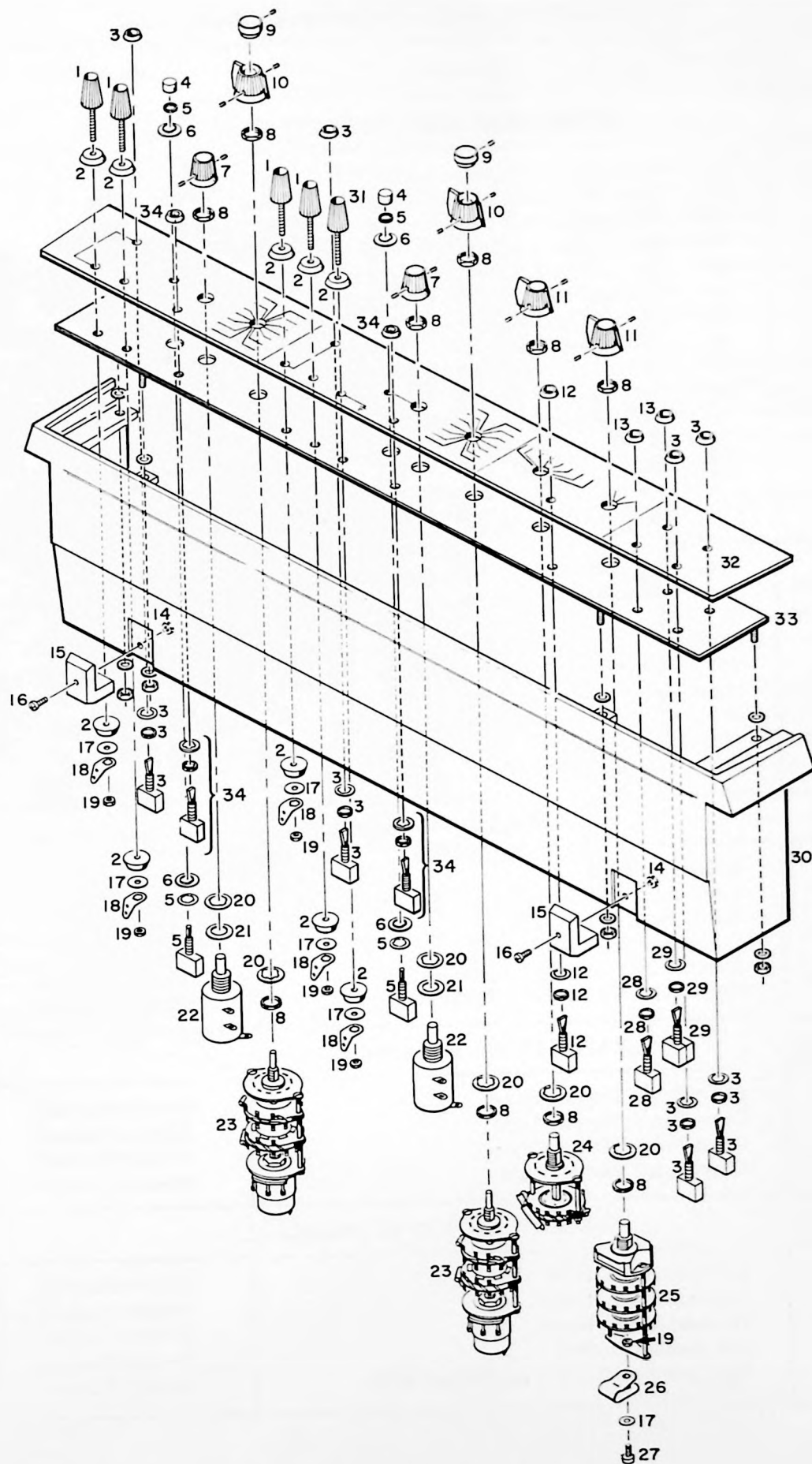


7044-D-31-1

Figure 6-1. Main Frame — Model 7044B (Sheet 3 of 3)

Table 6-2. Control Panel Assembly — Model 7044B

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	1510-0080	0	4	BINDING POST SGL THD-STUD BLK RED	28480	1510-0080
2	07046-40420	6	10	INSULATOR-BINDING POST, RED	28480	07046-40420
3	3101-1702	0	10	SWITCH-TGL SUBMIN SPDT 2A 250VAC	28480	3101-1702
4	3101-1671	2	2	CAP-PUSHBUTTON BLACK, .375-IN DIA	28480	3101-1671
5	3101-1261	6	2	SWITCH-PB SPDT MOM 1A 115VAC	28480	3101-1261
6	07046-40410	4	4	INSULATOR-ZERO CHECK	28480	07046-40410
7	0370-1095	0	2	KNOB-BASE 1/2 OBP .25-IN-ID	28480	0370-1095
8	2950-0043	8	6	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
9	0370-3040	9	2		28480	0370-3040
10	0370-3002	3	2	KNOB-BASE-CONC-PTR-AND-BAR 1/2 OBP	28480	0370-3002
11	0370-3003	4	1	KNOB-BASE-PTR-AND-BAR 1/2 OBP .25-IN-ID	28480	0370-3003
12	3101-1701	9	1	SWITCH-TGL SUBMIN SPDT .02A 20VAC/DC	28480	3101-1701
13	0590-0985	1	2	NUT-SPCLY 1/4-40-THD .12-IN-THK .35-A/F	28480	0590-0985
14	0510-0195	7	2	NUT-HEX-MET LKG 6-32-THD .172-IN-THK	28480	0510-0195
15	0403-0190	5	2	FOOT-RUBBER, .2900D, .093DP, .156DIA THRU	28480	0403-0190
16	2360-0085	7	2	SCREW-WACH 6-32 .562-IN-LG TR-HD-PHL	00000	ORDER BY DESCRIPTION
17	3050-0399	0	6	WASHER-FL HTLC NO. 6 .143-IN-ID	28480	3050-0399
18	0360-0365	4	5	TERMINAL-SLDR LUG LK-MTG FOR-#6-SCR	28480	0360-0365
19	2420-0003	7	5	NUT-HEX-DBL-CHAM 6-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
20	2190-0003	8	5	WASHER-LK HLCL NO. 4 .115-IN-ID	28480	2190-0003
21	2190-0188	0	2	WASHER-FL HTLC 5/16 IN .375-IN-ID	28480	2190-0188
22	2100-2682	4	2	RESISTOR-VAR PREC W 10-TR 10K	28480	2100-2682
23	07046-60190	9	2	ATTENUATOR ASSEMBLY	28480	07046-60190
24	07046-60901	0		SLEEP RATE ASSEMBLY	28480	07046-60901
25	3100-3083	2	1	SWITCH-ROTARY 0.812 STRUT CTR SPCG; 3	28480	3100-3083
26	0510-0788	4	1	CLAMP-CABLE .25-DIA .5-IN-ETH-CELL	28480	0510-0788
27	2360-0117	6	3	SCREW-WACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
28	3101-1604	1	1	SWITCH-TGL SUBMIN SPDT 2A 250VAC	28480	3101-1604
29	07044-60605	9	1	LINE SWITCH ASSEMBLY	28480	07044-60605
30	07040-21050	2	1	FRONT CASTING	28480	07040-21050
31	1510-0081	1	1	BINDING POST SGL THD-STUD BLK BLK	28480	1510-0081
32	07044-00903	4	1	FRONT PANEL (ENGLISH)	28480	07044-00903
	07044-00904	5		FRONT PANEL (METRIC)	28480	07044-00904
	07044-00911	4		FRONT PANEL (OPT. 001) ENGLISH	28480	07044-00911
	07044-00912	5		FRONT PANEL (OPT. 001) METRIC	28480	07044-00912
33	07044-00901	2	1	SUB-PANMEL	28480	07044-00901
34	3101-1702	0		SWITCH-TGL SUBMIN SPDT 2A 250VAC	28480	3101-1702



7044-C-32-1

Figure 6-2. Control Panel – Model 7044B

Table 6-3. Miscellaneous Parts — Model 7044B

HP Part No.	Description	Manufacturer	Qty
X AND Y ATTENUATOR ASSEMBLY PART NO. 07046-60910			
0698-6353	R1 R:Fxd Flm 50 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6627	R2 R:Fxd Flm 25 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6619	R3 R:Fxd Flm 15 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6320	R4 R:Fxd Flm 5 k ohms 0.05% 1/8 W	TRW, Inc.	1
0698-6631	R5 R:Fxd Flm 2.5 k ohm 1% 1/8W	TRW, Inc.	1
0698-6347	R6 R:Fxd Flm 1.5 k ohms 0.1% 1/8 W	TRW, Inc.	1
0699-0624	R7 R:Fxd Flm 1 k ohms 1% 1/4 W	TRW, Inc.	1
0698-6305	R8 R:Fxd Flm 900 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6342	R9 R:Fxd Flm 90 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6343	R10 R:Fxd Flm 9 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6362	R11 R:Fxd Flm 1 k ohms 0.1% 1/8 W	TRW, Inc.	1
2100-3917	R13 R:Var 5 k ohms 10 T	Spectrol	1
3100-1666	S2a/b Switch, Rotary	Hewlett-Packard	2
TIME BASE SWITCH ASSEMBLY PART NO. 07046-60901			
0699-0724	R1 R:Fxd Metal Flm 10 M ohms 0.1% 1/2 W	TRW, Inc.	1
0699-0725	R2 R:Fxd Metal Flm 6 M ohms 0.1% 1/2 W	TRW, Inc.	1
0698-6537	R3 R:Fxd Flm 2 M ohm 0.1% 1/2 W	TRW, Inc.	1
0698-6369	R4 R:Fxd Flm 1 M ohms 0.1% 1/4 W	TRW, Inc.	1
0698-6632	R5 R:Fxd Flm 600 k ohms 0.1% 1/4 W	TRW, Inc.	1
0698-6376	R6 R:Fxd Flm 200 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6358	R7 R:Fxd Flm 100 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6688	R8 R:Fxd Flm 99.8 k ohms 0.1% 1/8 W	TRW, Inc.	1
3100-1665	S1 Switch, Rotary	Hewlett-Packard	1
OPERATING SUPPLIES			
5080-3605	Slidewire Cleaner	Hewlett-Packard	1
1251-1029	Lock, Rack and Panel	ITT Cannon	1
1251-2368	Hood, Rack and Panel	ITT Cannon	1
1251-3062	Connector, Rack and Panel	ITT Cannon	1
07040-60918	Event Marker Assembly (Option 002)	Hewlett-Packard	1
5080-3655	Plastic Tip, Pen Assembly (Option 002)	Hewlett-Packard	Pkg of 5
GRAPH PAPER — ENGLISH AND METRIC			
9270-1004	Chart Paper, English, Heavy	Hewlett-Packard	
9270-1005	Chart Paper, English, Light	Hewlett-Packard	
9270-1024	Chart Paper, Metric, Heavy	Hewlett-Packard	
9270-1042	Chart Paper, Metric, Light	Hewlett-Packard	
INK SUPPLIES (MAY BE ORDERED)			
5081-1191	Disposable Pen, Blue	Hewlett-Packard	Pkg of 3
5081-1192	Disposable Pen, Green	Hewlett-Packard	Pkg of 3
5081-1193	Disposable Pen, Black	Hewlett-Packard	Pkg of 3
5081-1190	Disposable Pen, Red	Hewlett-Packard	Pkg of 3
1530-1026	Ink Cartridge, Red (77 cc) (Option 002)	Hewlett-Packard	Pkg of 3

Table 6-3. Miscellaneous Parts — Model 7044B (Continued)

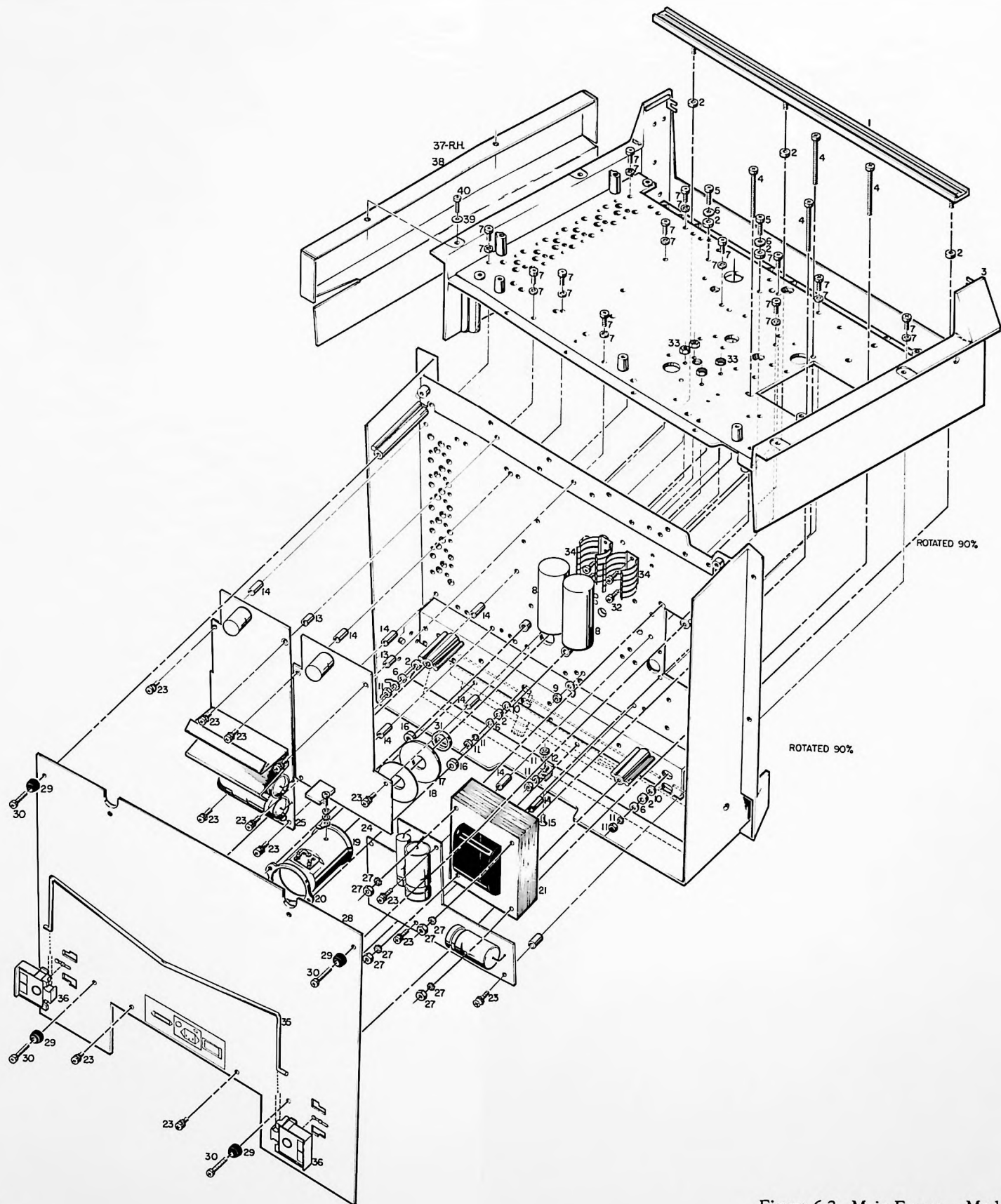
HP Part No.	Description	Manufacturer	Qty
ELECTRONIC COMPONENTS/ASSEMBLIES			
07040-60570	Slidewire Assembly (19.2k) X-axis	Hewlett-Packard	1
07040-60550	Slidewire Assembly (13.1k) Y-axis	Hewlett-Packard	1
5080-8117	Slide Wiper Assembly (X-axis)	Hewlett-Packard	2
07046-60440	Slide Wiper Assembly (Y-axis)	Hewlett-Packard	1
07044-60500	Y-axis Amplifier Assembly — English	Hewlett-Packard	1
07044-60100	X-axis Amplifier Assembly — English	Hewlett-Packard	1
07044-60202	Power Supply Board Assembly (Does not include option parts.)	Hewlett-Packard	1
07044-60301	TTL Board Assembly	Hewlett-Packard	1
07044-60400	Time Base Board Assembly	Hewlett-Packard	1
07044-60580	Y-axis Amplifier Assembly — Metric	Hewlett-Packard	1
07044-60590	X-axis Amplifier Assembly — Metric	Hewlett-Packard	1
MAIN FRAME COMPONENTS			
1251-2357	P1 AC Receptacle	Switchcraft, Inc.	1
0491-0059	L1 Solenoid Assembly	Ledex	1
07044-60510	T1 Power Transformer	Hewlett-Packard	1
5060-6608	X Motor Assembly	Hewlett-Packard	1
5060-6608	Y Motor Assembly	Hewlett-Packard	1
2100-2682	R13 Potentiometer, 10k, 10 turn	Beckman	1
07040-60570	R14 X Slidewire	Hewlett-Packard	1
07040-60550	R14 Y Slidewire	Hewlett-Packard	1
07040-60921	Clamp, Shipping	Hewlett-Packard	1
4040-0879	Cover, Dust, Plastic	Hewlett-Packard	1

Table 6-4. One Year Spare Parts List – Model 7044B

Reference Designation	HP Part No.	CD	Description	Qty.
A3	07040-60100	9	X-Axis Amplifier PCA	1
A1F1	2110-0003	0	Fuse 3A 250V Fast-Blow	10
86F	2110-0007	4	Fuse 1A 250V Slow-Blow	10
A2F1,F2	2110-0043	8	Fuse 1.5A 250V Fast-Blow	10
F1	2110-0202	1	Fuse .5A 250V Slow-Blow	10
A2Q11	1853-0036	2	Transistor PNP SI PD = 310MW	1
A3Q11				
A2R25,R41,R42	0757-0279	0	Resistor 3.16K 1% .125W	2
A3R41,R42,R44				
A2R34,R50,R51	0757-0401	0	Resistor 100Ω 1% .125W	2
A3R34,R45,R46				
A2R37	2100-2497	9	Resistor – TRMR Top-Adj 1-TRW 2K 10%	1
A3R37				
R11	2100-2682	4	Resistor – VAR Prec WW 10-TRN 10K	1
A2R6	2100-3288	8	Resistor – VAR 10-TRN 2K 5%	1
A3R6				
R10	2100-3675	7	Resistor – VAR W/SW 5K 10%	1
R13	07040-60550	9	Y-Axis Slidewire Assembly	1
R13	07040-60570	3	X-Axis Slidewire Assembly	1
A1U1	1820-0269	4	IC GATE TTL NAND QUAD 2-INP	1
A4U1				
A4U3	1820-1270	9	IC MW TTL L MONOSTBL	1
	5080-8117	1	Wiper Assembly – X-Axis	1
	07046-60440	2	Wiper Assembly – Y-Axis	1
	3101-1702	0	Switch – TGL SUBMIN SPDT	2
	07046-60910	1	Attenuator Assembly X- and Y-Axis	1
	07046-60440	2	Wiper Assembly – Y-Axis	1
	3101-1702	0	Switch – TGL SUBMIN SPDT	2
	07046-60910	1	Attenuator Assembly X- and Y-Axis	1

Table 6-5. Main Frame — Model 7045B (Sheet 1 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	07040-60570		1	X-AXIS SLIDEWIRE ASSEMBLY (19.2K)	28480	07040-60570
2	1200-0092		8	WASHER-SHOULDER 0.375 OD, 0.187 CHK	00000	ORDER BY DESCRIPTION
3	07040-60580	5	1	CASTING-MAIN FRAME	28480	07040-60580
4	2510-0142	6	4	SCREW-MACH 8-32 2.125-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
5	2360-0203	1	2	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
6	3050-0399	0	7	WASHER-FL NTLG NO. 6 .143-IN-ID	28480	3050-0399
7	2360-0121	2	19	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
8	0180-2495	3	2	CAPACITOR-FXD 4700UF+75-10X 40VDC AL	28480	0180-2495
9	0590-0381	1	21	NUT-HEX-W/LKAR 6-32-THD .12-IN-THK	00000	ORDER BY DESCRIPTION
10	3050-0392	3	2	WASHER-FL NTLG 1/4 IN .26-IN-ID	28480	3050-0392
11	0590-0381	1	1	NUT-HEX-W/LKAR 6-32-THD .12-IN-THK	00000	ORDER BY DESCRIPTION
12	07040-00240	8	1	BRACKET-SUPPORT	28480	07040-00240
13	0380-0310	1	9	STANDOFF-RVT-ON .75-IN-LG 6-32-THD	00000	ORDER BY DESCRIPTION
14	0380-0771	8	2	STANDOFF-RVT-ON .625-IN-LG 6-32-THD	28480	0380-0771
15	2360-0183	6	5	SCREW-MACH 6-32 .375-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
16	07041-20140	0	2	WASHER-FLAT	28480	07041-20140
17	3050-0774	5	1	WASHER-FL NM 11/16 IN .7-IN-ID	28480	3050-0774
18	3050-0775	6	1	WASHER-FL NM 11/16 IN .7-IN-ID	28480	3050-0775
19	5060-6627	2	1	SERVO MOTOR-X-AXIS	28480	5060-6627
20	1600-0252	7	1	CLAMP-SERVO MOTOR	28480	1600-0252
21	07045-60140	8	1	TRANSFORMER-POWER	28480	07045-60140
22	07044-60200	0	1	POWER SUPPLY BOARD	28480	07044-60200
23	2360-0113	2	19	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
24	07045-60080	5	1	X-AXIS AMPLIFIER BOARD (ENGLISH)	28480	07045-60080
	07045-60100	0		X-AXIS AMPLIFIER BOARD (METRIC)	28480	07045-60100
25	07045-60090	7	1	Y-AXIS AMPLIFIER BOARD (ENGLISH)	28480	07045-60090
	07045-60110	2		Y-AXIS AMPLIFIER BOARD (METRIC)	28480	07045-60110
26			1	NOT ASSIGNED		
27	2580-0006	8	8	NUT-HEX-W/LKAR 8-32-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
28	07045-60435	4	1	BOTTOM COVER	28480	07045-60435
29	0403-030335	1	4	FOOT-RUBBER	28480	0403-030335
30	2360-0201	9	8	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
31	07041-20075	0	1	BUSHING-X-AXIS SERVO MOTOR	28480	07041-20075
32	2360-0197	2	5	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
33	0590-0381	1	1	NUT-HEX-W/LKAR 6-32-THD .12-IN-THK	00000	ORDER BY DESCRIPTION
34	1400-0867	8	2	CLIP-CMPNT 1.18-1.58-DIA .75-HD STL	28480	1400-0867
35	1490-0030	6	1	TILT STAND 3-IN-W 13.75-IN-OD-LG SST	28480	1490-0030
36	5060-0767	9	2	FOOT ASSYIFM	28480	5060-0767
37	07040-00417	1	1	R.H. SIDE TRIM	28480	07040-00417
38	07040-00416	0	1	L.H. SIDE TRIM	28480	07040-00416
39	2190-0303	1	4	WASHER-FL NM NO. 10 .196-IN-ID	28480	2190-0303
40	2510-0020	9	4	SCREW-MACH 8-32 .375-IN-LG TR-HD-PHL	00000	ORDER BY DESCRIPTION

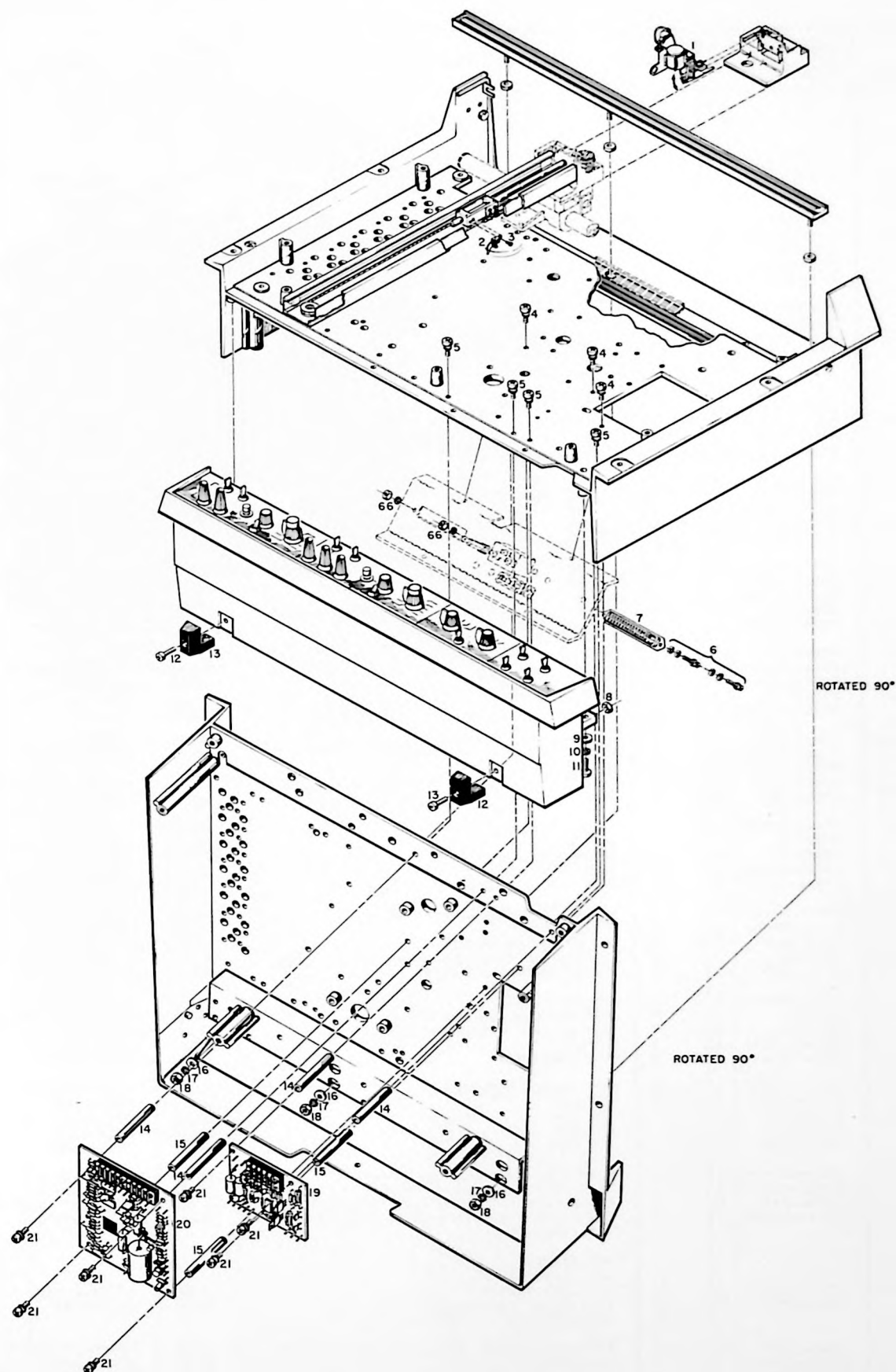


7045-D-5-1

Figure 6-3. Main Frame — Model 7045B
(Sheet 1 of 3)

Table 6-5. Main Frame — Model 7045B (Sheet 2 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	07040-60918	3	1	EVENT MARKER ASSEMBLY (OPT. 002)	28480	07040-60918
2	5080-8117	1	1	WIPER ASSEMBLY-Y-AXIS	28480	5080-8117
3	0516-0004	9	1	SCREW=MACH 0-80 .125-IN-LG PAN=HD-SLT	00000	ORDER BY DESCRIPTION
4	2360-0117	6	4	SCREW=MACH 6-32 .375-IN-LG PAN=HD-POZI	00000	ORDER BY DESCRIPTION
5	2360-0119	8	4	SCREW=MACH 6-32 .438-IN-LG PAN=HD-POZI	00000	ORDER BY DESCRIPTION
6	1251-0218	6	2	LOCK-SUBMIN D CONN	28480	1251-0218
7	1251-3162	5	1	CONNECTOR 37-PIN F AMPHENOL 17	28480	1251-3162
8	1251-3122	7	1	CONTACT=CONN U/M=AMPH=17 FEM CRP	28480	1251-3122
9	0510-0195	7	2	NUT=HEX-MET LKG 6-32-THD .172-IN=THK	28480	0510-0195
10	3050-0399	0	2	WASHER=FL MTLC NO. 6 .143-IN-ID	28480	3050-0399
11	2190-0007	2	3	WASHER=LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
12	2360-0203	1	4	SCREW=MACH 6-32 .625-IN-LG PAN=HD-POZI	00000	ORDER BY DESCRIPTION
13	0403-0190	5	2	FOOT=RUBBER, .2900D, .093DP, .156DIA THRU	28480	0403-0190
14	2360-0085	7	2	SCREW=MACH 6-32 .562-IN-LG TR=HD-PHL	00000	ORDER BY DESCRIPTION
15	0380-1023	5	2	STANDOFF=RVT=ON 1.625-IN-LG 6-32TMD	00000	ORDER BY DESCRIPTION
16	0380-0789	8	1	STANDOFF=RVT=ON 1.75-IN-LG 6-32TMD	28480	0380-0789
17	3050-0399	0	1	WASHER=FL MTLC NO. 6 .143-IN-ID	28480	3050-0399
18	2190-0007	2	1	WASHER=LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
19	0590-0381	1	1	NUT=HEX=M/LKMR 6-32-TMD .12-IN=THK	00000	ORDER BY DESCRIPTION
20	07045-60070	3	1	TTL BOARD (OPT. 039)	28480	07045-60070
21	07045-60120	4	1	TIME BASE BOARD (A/O R9, R11)	28480	07045-60120
22	2360-0113	2	1	SCREW=MACH 6-32 .25-IN-LG PAN=HD-POZI	00000	ORDER BY DESCRIPTION



7045-D-6-1

Figure 6-3. Main Frame — Model 7045B (Sheet 2 of 3)

Table 6-5. Main Frame — Model 7045B (Sheet 3 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	0570-0125	9	1	SCREW-MACH 4-40 .188-IN-LG BDG-HD-SLT	00000	ORDER BY DESCRIPTION
2	07040-60551	0	1	GEAR DRIVE-Y-AXIS	28480	07040-60551
3				NOT ASSIGNED		
4	0510-0242	5	1	RETAINER-RING .5-IN-DIA	28480	0510-0242
5	07040-20730	3	1	RETAINER-Y-AXIS GEAR DRIVE	28480	07040-20730
6	2360-0207	5	1	SCREW-MACH 6-32 .875-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
7	2420-0016	2	3	NUT-HEX-DBL-CHAM 6-32-THD .062-IN-THK	00000	ORDER BY DESCRIPTION
8	2190-0105	1	4	WASHER-LK HLCL NO. 6 .141-IN-ID	28480	2190-0105
9	2360-0183	6	5	SCREW-MACH 6-32 .375-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
10	2190-0179	9	2	WASHER-LK .142-IN-ID	28480	2190-0179
11	07040-20600	6	1	WASHER-MOTOR BLOCK	28480	07040-20600
12	2360-0420	4	2	SCREW-MACH 6-32 .312-IN-LG TR-HD-POZI	00000	ORDER BY DESCRIPTION
13				NOT ASSIGNED		
14				NOT ASSIGNED		
15	07040-60830	8	1	MOTOR BLOCK-Y-ARM	28480	07040-60830
16	2190-0108	4	2	WASHER-LK HLCL NO. 4 .115-IN-ID	28480	2190-0108
17	2200-0141	8	1	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
18	07040-40040	0	1	CLAMP-SERVO MOTOR	28480	07040-40040
19	5060-6608	9	1	SERVO MOTOR, Y-AXIS	28480	5060-6608
20	3050-0393	4	1	WASHER-FL MTLC NO. 6 .141-IN-ID	28480	3050-0393
21	07040-20950	9	2	WASHER-FL .13-IN-ID	28480	07040-20950
22	07040-00200	0	1	BRACKET-TRAILING CABLE	28480	07040-00200
23	1460-1248	7	1	SPRING-EXT .312-IN-OD 16-IN-CA-LG MUM	28480	1460-1248
24	2360-0221	3	2	SCREW-MACH 6-32 2.5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
25	07040-60670	4	1	SLIDER BLOCK-X-AXIS	28480	07040-60670
26	07040-20620	0	1	SLIDER ROD-X-AXIS	28480	07040-20620
27	0362-0191	8	1	SLEEVE-METAL .125-OD BRS .07-ID .281-LG	28480	0362-0191
28	07040-40020	6	1	TIGHTENER-CABLE	28480	07040-40020
29	0905-0442	4	2	O-RING .489-IN-ID .07-IN-XSECT-DIA NTRL	28480	0905-0442
30	0516-0005	0	6	SCREW-MACH 0-80 .188-IN-LG PAN-HD-SLT	00000	ORDER BY DESCRIPTION
31	5080-8117	1	1	WIPER ASSY	28480	5080-8117
32	0510-0198	0	1	NUT-HEX-DBL-CHAM 0-80-THD .047-IN-THK	00000	ORDER BY DESCRIPTION
33	07040-60680	6	1	WIPER BLOCK	28480	07040-60680
34	2360-0318	9	1	SCREW-MACH 6-32 1.875-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
35	07040-00020	2	1	BUMPER-X-AXIS SLIDER BLOCK	28480	07040-00020
36	07040-60520	3	1	AUTOGRIIP PLATEN	28480	07040-60520
37	2360-0201	9	8	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
38	0905-0363	8	2	O-RING .239-IN-ID .067-IN-XSECT-DIA NTRL	28480	0905-0363
39	07040-20560	7	1	SLIDER ROD-Y-AXIS	28480	07040-20560
40	0890-0349	7	2	TUBING-FLEX .057-ID	28480	0890-0349
41	1460-1253	4	1	SPRING-EXT .095-IN-OD MUM OIL CTD	28480	1460-1253
42	07040-60916	1	1	SCALE-Y-AXIS (ENGLISH)	28480	07040-60916
	07040-60917	2	1	SCALE-Y-AXIS (METRIC)	28480	07040-60917
43	07040-60550	9	1	SLIDEWIRE ASSEMBLY-Y-AXIS	28480	07040-60550
44	07040-20160	3	1	PULLEY STUD	28480	07040-20160
45	07040-20540	3	1	PULLEY IDLER-Y-AXIS	28480	07040-20540
46	2200-0138	3	1	SCREW-MACH 4-40 .188-IN-LG UNCT 100 DEG	00000	ORDER BY DESCRIPTION
47	07040-60913	8	1	CABLE ASSEMBLY-Y-AXIS	28480	07040-60913
48	07040-00290	8	1	BRACKET-CABLE	28480	07040-00290
49	2260-0001	5	4	NUT-HEX 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
50	2190-0004	9	1	WASHER INTL T NO.4 115-IN-ID	28480	2190-0004
51	07040-40080	8	1	CAP-END	28480	07040-40080
52	07040-20610	8	2	WHEEL-END CAP	28480	07040-20610
53	07041-60001	6	1	PEN HOLDER ASSEMBLY	28480	07041-60001
54	5081-1190	8	1	KEY CAP	28480	5081-1190
	5081-1191	9		KEY CAP	28480	5081-1191
	5081-1192	0		KEY CAP	28480	5081-1192
	5081-1193	1		KEY CAP	28480	5081-1193
55	07044-00909	0	1	REAR HOOD ASSEMBLY (ENGLISH)	28480	07044-00909
	07044-00910	3		REAR HOOD ASSEMBLY (METRIC)	28480	07044-00910
56	2430-0004	9	2	SCREW-MACH 6-32 .5-IN-LG TR-HD-PHL	00000	ORDER BY DESCRIPTION
57	07040-60570	3	1	SLIDEWIRE ASSEMBLY-X-AXIS (19.2K)	28480	07040-60570
58				NOT ASSIGNED		
59				NOT ASSIGNED		
60				NOT ASSIGNED		
61	07040-60030	0	1	PEN LIFT ASSEMBLY	28480	07040-60030
62	1460-1252	3	1	SPRING-EXT .31-IN-OD MUM	28480	1460-1252
63				NOT ASSIGNED		
64	2360-0117	6	3	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
65	07040-20650	6	1	PAPER STOP	28480	07040-20650
66	2360-0199	4	4	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
67	07040-20670	0	1	Y-ARM SUPPORT	28480	07040-20670
68	07040-20200	2	2	NUT-HOOD	28480	07040-20200
	2950-0072	3		NUT-HEX-DBL-CHAM 1/4-32-THD .062-IN-THK	00000	ORDER BY DESCRIPTION

Table 6-5. Main Frame — Model 7045B (Sheet 4 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
69	1600-0065	2	2	RETAINER RING	28480	1600-0065
70	07040-00210	2	1	TIME GUIDE	28480	07040-00210
71	0590-0391	1	6	NUT-HEX-M/LK 6-32-THD .12-IN-THK	00000	ORDER BY DESCRIPTION
72	2360-0229	1	1	SCREW-PAN POZI	28480	2360-0229
73	0624-0206	2	3	SCREW-TPG 6-32 .25-IN-LG PAN-HD-POZI STL	28480	0624-0206
74	07046-60410	3	1	DRIVE GEAR ASSEMBLY	28480	07040-60710
75	07040-20520	9	4	SLEEVE-IDLER PULLEY	28480	07040-20520
76	07040-60840	5	1	IDLER PULLEY	28480	07040-60217
77	2190-0151	7	2	WASHER-FL MTLC NO. 8 .174-IN-ID	28480	2190-0151
78	3050-0139	6	10	WASHER-FL MTLC NO. 8 .172-IN-ID	28480	3050-0139
79	07040-60580	5	1	CASTING-MAINFRAME	28480	07040-60580
80	2200-0165	6	1	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
81	2360-0113	2	19	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
82	0510-0790	8	5	CABLE CLAMP-MFCL .312-DIA .312-ND STL	28480	0510-0790
83	07040-00140	7	1	GUARD-TRAILING CABLE ASSEMBLY	28480	07040-00140
84	07040-00050	8	1	GUIDE-TRAILING CABLE SPRING	28480	07040-00050
85	07044-60906	3	1	BRACKET ASSEMBLY-POWER	28480	07044-60906
86A	2110-0465	8	1	FUSEHOLDER CAP EXTR PST; BAYONET; 20A	28480	2110-0465
86B	2110-0470	5	1	FUSEHOLDER BODY EXTR PST; BAYONET; TND	75915	345003-010
86C	2110-0467	0	1	FUSEHOLDER COMPONENT HEX NUT; 1/2-28	28480	2110-0467
86D	2190-0152	8	8	WASHER-FL MTLC NO. 8 .188-IN-ID	28480	2190-0152
86E	2190-0152	8	2	WASHER-FL MTLC NO. 8 .188-IN-ID	28480	2190-0152
86F	2190-0452	1	1	WASHER-RECTANGULAR 0.140 IN ID; 0.516 IN	95987	06-140
	2110-0007	4	1	FUSE 1A 250V TD 1.25X.25 UL	75915	313001
	2110-0202	1	1	FUSE .5A 250V TD 1.25X.25 UL	75915	313.500
87	2190-0068	5	1	WASHER-LK INTL T 1/2 IN .505-IN-ID	28480	2190-0068
88	0510-0195	7	2	NUT-HEX-MET LKG 6-32-THD .172-IN-THK	28480	0510-0195
89	2360-0203	1	6	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
90	0403-0190	5	2	FOOT-RUBBER .2900D .0930P .156DIA THRU	28480	0403-0190
91	2360-0085	7	2	SCREW-MACH 6-32 .562-IN-LG TR-HD-PHL	00000	ORDER BY DESCRIPTION
92	07040-20170	5	1	FRONT CASTING	28480	07040-21050
93	07040-20760	9	1	STOP-PAPER	28480	07040-20760
94	2360-0309	8	1	SCREW-MACH 6-32 PAN-HD-POZI	28480	2360-0309
95	3050-0766	5	1	WASHER-FL NM NO. 6 .14-IN-ID .5-IN-OD	28480	3050-0766
96	07040-60914	9	1	CABLE ASSEMBLY X-AXIS	28480	07040-60914
96	07041-60009	4	1	CABLE ASSEMBLY	28480	07041-60009
97	0491-0059	0	1	SOLENOID-RTY	28480	0491-0059
98	07040-00240	4	1	BRACKET-SOLENOID ASSEMBLY	28480	07040-00240
99	07040-20870	2	1	PLUNGER END	28480	07040-20870
100	0615-0005	0	2	NUT; HEX 3-48 .062 X .188; SST; PSVT	28480	0615-0005
101				NOT ASSIGNED		
102	07040-20745	0	1	BLOCK-Y SLIDER	28480	07040-20745
103	1353-4252	4	1	TRANSISTOR PNP SI ID-E PD=150V FT=40HZ	28480	1353-4252
104	1854-0063	7	1	TRANSISTOR NPN 2N3055 SI ID-3 PD=115V	01921	2N3055
105	0340-0774	7	1	INSULATOR-XSTR TFE	02480	0340-0774
106	2200-0170	3	1	SCREW-MACH 4-40 .625-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
107	1200-0461	4	2	SOCKET-XSTR 2-CONT TD-3 SLOW-EYE	28480	1200-0461
108	2190-0108	4	4	WASHER-LK HLCL NO. 4 .115-IN-ID	28480	2190-0108
109	2260-0001	5	5	NUT-HEX-DBL-CHAN 4-40-THD .074-IN-THK	28480	2260-0001
110	07041-20020	5	1	STANDOFF	28480	07041-20020
111	1410-0269	5	1	BALL BEARING	28480	1410-0269
112	07046-60440	2	1	WIPER ASSEMBLY, Y-AXIS	28480	07046-60440
113	07046-20002	8	1	HOOD-BLOCK	28480	07046-20002
114	1251-2101	0	1	JACK-BNA SINGLE RED SLDT-LUB-TERM	28480	1251-2101
115	1251-2102	1	1	JACK-BNA SINGLE BLK SLDR-LUG-TERM	28480	1251-2102

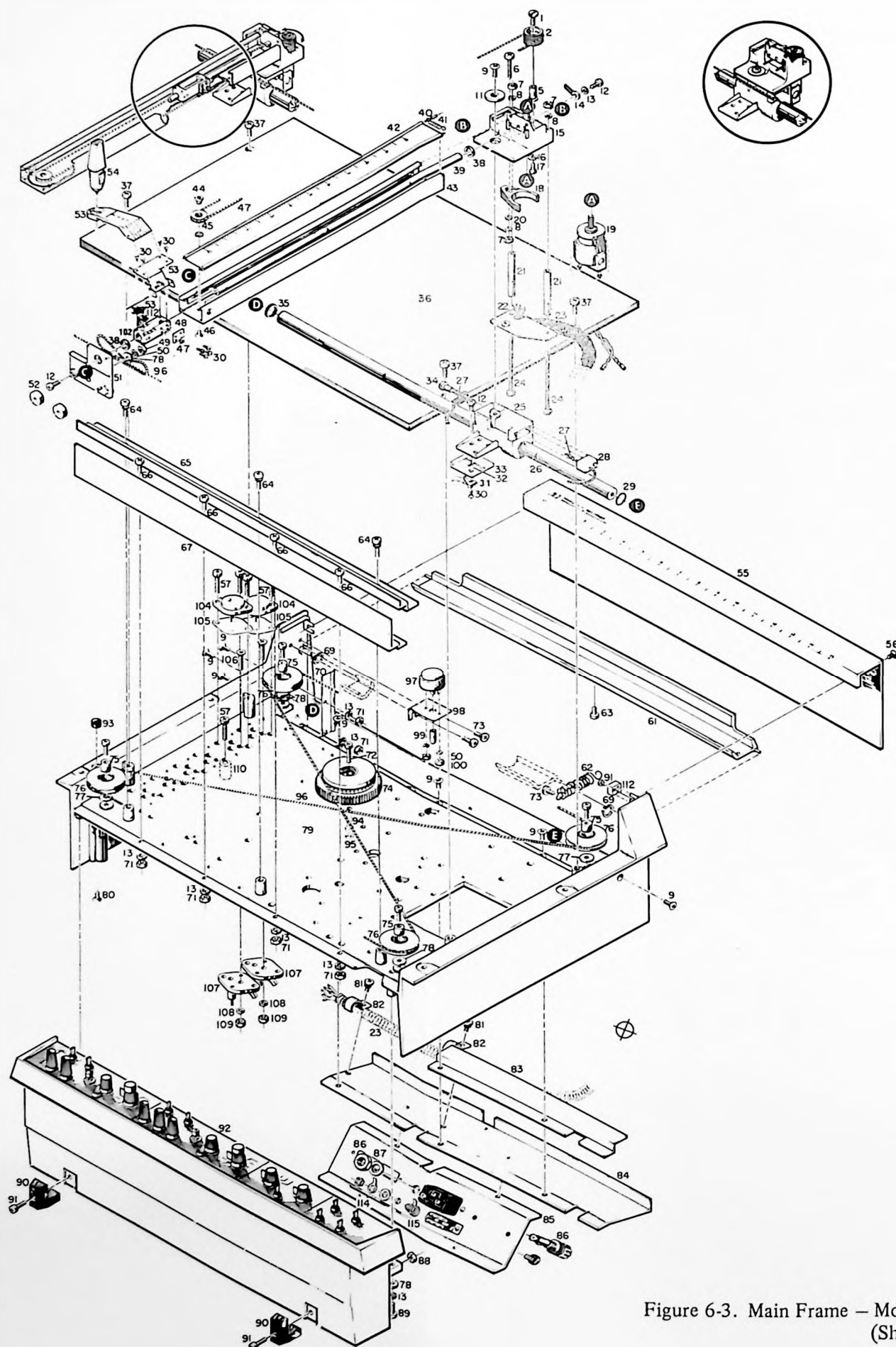
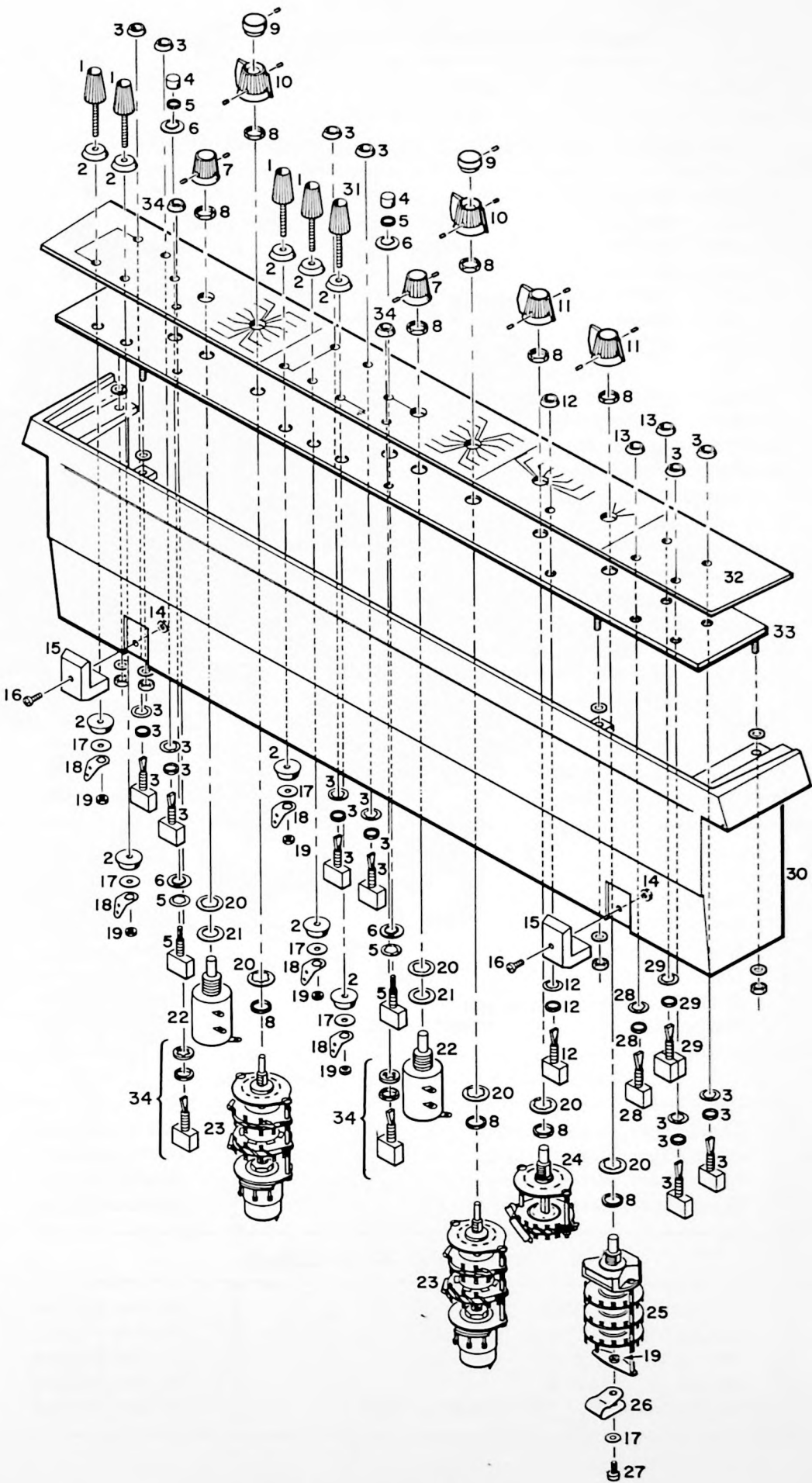


Figure 6-3. Main Frame – Model 7045B
(Sheet 3 of 3)

Table 6-6. Control Panel Assembly — Model 7045B

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	1510-0080	0	4	BINDING POST SGL THD-STUD BLK RED	28480	1510-0080
2	07046-40420	6	10	INSULATOR-BINDING POST, RED	28480	07046-40420
3	3101-1702	0	8	SWITCH-TGL SUBMIN SPDT 2A 250VAC	28480	3101-1702
4	3101-1671	2	2	CAP-PUSHBUTTON BLACK, .375-IN DIA	28480	3101-1671
5	3101-1261	6	2	SWITCH-PB SPCT NOM 1A 115VAC	28480	3101-1261
6	07046-40104	3	4	INSULATOR-ZERO CHECK	28480	07046-40104
7	0370-1095	0	2	KNOB-BASE 1/2 DBP .25-IN-ID	28480	0370-1095
8	2950-0043	8	6	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
9	0370-3040	9	2		28480	0370-3040
10	0370-3002	3	2	KNOB-BASE-CONC-PTR-AND-BAR 1/2 DBP	28480	0370-3002
11	0370-3003	4	1	KNOB-BASE-PTR-AND-BAR 1/2 DBP .25-IN-ID	28480	0370-3003
12	3101-1701	9	1	SWITCH-TGL SUBMIN SPDT .02A 20VAC/DC	28480	3101-1701
13	0590-0985	1	2	NUT-SPCLY 1/4-40-THD .12-IN-THK .35-A/F	28480	0590-0985
14	0510-0195	7	2	NUT-HEX-MET LKG 6-32-THD .172-IN-THK	28480	0510-0195
15	0403-0190	5	2	FOOT-RUBBER, .2900D, .093DP, .156DIA THRU	28480	0403-0190
16	2360-0085	7	2	SCREW-WACH 6-32 .562-IN-LG TR-HD-PHL	00000	ORDER BY DESCRIPTION
17	3050-0399	0	6	WASHER-FL MTLC NO. 6 .143-IN-ID	28480	3050-0399
18	0360-0365	4	5	TERMINAL-SLDR LUG LK-MTG FOR-#6-SCR	28480	0360-0365
19	2420-0003	7	5	NUT-HEX-DBL-CHAM 6-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
20	2190-0003	8	5	WASHER-LK HLCL NO. 4 .115-IN-ID	28480	2190-0003
21	2190-0188	0	2	WASHER-FL MTLC 5/16 IN .375-IN-ID	28480	2190-0188
22	2100-2682	4	2	RESISTOR-VAR PREC W 10-TRN 10K	28480	2100-2682
23	07046-60910	1	2	ATTENUATOR ASSEMBLY	28480	07046-60910
24	07046-60901	0	1	SWEEP RATE ASSEMBLY	28480	07046-60901
25	3100-3083	2	1	SWITCH-ROTARY 0.812 STRUT CTR SPCG; 3	28480	3100-3083
26	0510-0788	4	1	CLAMP-CABLE .25-DIA .5-IN-ETH-CELL	28480	0510-0788
27	2360-0117	6	3	SCREW-WACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
28	3101-1604	1	1	SWITCH-TGL SUBMIN DPDT 2A 250VAC	28480	3101-1604
29	07044-60605	9	1	LINE SWITCH ASSEMBLY	28480	07044-60605
30	07040-21050	2	1	FRONT CASTING	28480	07040-21050
31	1510-0081	1	1	BINDING POST SGL THD-STUD BLK BLK	28480	1510-0081
32	07044-00903	4	1	FRONT PANEL (ENGLISH)	28480	07044-00903
	07044-00904	5		FRONT PANEL (METRIC)	28480	07044-00904
	07044-00911	4		FRONT PANEL (OPT, 001) ENGLISH	28480	07044-00911
	07044-00912	5		FRONT PANEL (OPT, 001) METRIC	28480	07044-00912
33	07044-00901	2	1	SUB-PANEL	28480	07044-00901
34	3101-1702	0		SWITCH-TGL SUBMIN SPDT 2A 250VAC	28480	3101-1702



7045-C-8-1

Figure 6-4. Control Panel – Model 7045B

Table 6-7. Miscellaneous Parts — Model 7045B

HP Part No.	Description	Manufacturer	Qty
X AND Y ATTENUATOR ASSEMBLY PART NO. 07046-60910			
0698-6353	R1 R:Fxd Flm 50 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6627	R2 R:Fxd Flm 25 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6619	R3 R:Fxd Flm 15 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6320	R4 R:Fxd Flm 5 k ohms 0.05% 1/8 W	TRW, Inc.	1
0698-6631	R5 R:Fxd Flm 2.5 k ohm 1% 1/8 W	TRW, Inc.	1
0698-6347	R6 R:Fxd Flm 1.5 k ohms 0.1% 1/8 W	TRW, Inc.	1
0699-0624	R7 R:Fxd Flm 1 k ohms 1% 1/4 W	TRW, Inc.	1
0698-6305	R8 R:Fxd Flm 900 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6342	R9 R:Fxd Flm 90 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6343	R10 R:Fxd Flm 9 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6362	R11 R:Fxd Flm 1 k ohms 0.1% 1/8 W	TRW, Inc.	1
2100-3917	R13 R:Var 5 k ohms 10 T	Spectrol	1
3100-1666	S2a/b Switch, Rotary	Hewlett-Packard	2
TIME BASE SWITCH ASSEMBLY PART NO. 07046-60901			
0699-0724	R1 R:Fxd Metal Flm 10 M ohms 0.1% 1/2 W	TRW, Inc.	1
0699-0725	R2 R:Fxd Metal Flm 6 M ohms 0.1% 1/2 W	TRW, Inc.	1
0698-6537	R3 R:Fxd Flm 2 M ohm 0.1% 1/2 W	TRW, Inc.	1
0698-6369	R4 R:Fxd Flm 1 M ohms 0.1% 1/4 W	TRW, Inc.	1
0698-6632	R5 R:Fxd Flm 600 k ohms 0.1% 1/4 W	TRW, Inc.	1
0698-6376	R6 R:Fxd Flm 200 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6358	R7 R:Fxd Flm 100 k ohms 0.1% 1/8 W	TRW, Inc.	1
0698-6688	R8 R:Fxd Flm 99.8 k ohms 0.1% 1/8 W	TRW, Inc.	1
3100-1665	S1 Switch, Rotary	Hewlett-Packard	1
OPERATING SUPPLIES			
5080-3605	Slidewire Cleaner	Hewlett-Packard	1
1251-1029	Lock, Rack and Panel	ITT Cannon	1
1251-2368	Hood, Rack and Panel	ITT Cannon	1
1251-3062	Connector, Rack and Panel	ITT Cannon	1
07040-60918	Event Marker Assembly (Option 002)	Hewlett-Packard	1
5080-3655	Plastic Tip, Pen Assembly (Option 002)	Hewlett-Packard	Pkg of 5
GRAPH PAPER — ENGLISH AND METRIC			
9270-1004	Chart Paper, English, Heavy	Hewlett-Packard	
9270-1005	Chart Paper, English, Light	Hewlett-Packard	
9270-1024	Chart Paper, Metric, Heavy	Hewlett-Packard	
9270-1042	Chart Paper, Metric, Light	Hewlett-Packard	
INK SUPPLIES (MAY BE ORDERED)			
5081-1191	Disposable Pen, Blue	Hewlett-Packard	Pkg of 3
5081-1192	Disposable Pen, Green	Hewlett-Packard	Pkg of 3
5081-1193	Disposable Pen, Black	Hewlett-Packard	Pkg of 3
5081-1190	Disposable Pen, Red	Hewlett-Packard	Pkg of 3
1530-1026	Ink Cartridge, Red (77 cc) (Option 002)	Hewlett-Packard	Pkg of 3

Table 6-7. Miscellaneous Parts -- Model 7045B (Continued)

HP Part No.	Description	Manufacturer	Qty
ELECTRONIC COMPONENTS/ASSEMBLIES			
07040-60570	Slidewire Assembly (19.2k) X-axis	Hewlett-Packard	1
07040-60550	Slidewire Assembly (13.1k) Y-axis	Hewlett-Packard	1
5080-8117	Slide Wiper Assembly (X-axis)	Hewlett-Packard	2
07046-60440	Slide Wiper Assembly (Y-axis)	Hewlett-Packard	1
07045-60090	Y-axis Amplifier Assembly -- English	Hewlett-Packard	1
07045-60080	X-axis Amplifier Assembly -- English	Hewlett-Packard	1
07044-60202	Power Supply Board Assembly (Does not include option parts.)	Hewlett-Packard	1
07045-60115	TTL Board Assembly	Hewlett-Packard	1
07045-60070	Time Base Board Assembly	Hewlett-Packard	1
07045-60110	Y-axis Amplifier Assembly -- Metric	Hewlett-Packard	1
07045-60100	X-axis Amplifier Assembly -- Metric	Hewlett-Packard	1
MAIN FRAME COMPONENTS			
1251-2357	P1 AC Receptacle	Switchcraft, Inc.	1
0491-0059	L1 Solenoid Assembly	Ledex	1
07045-60140	T1 Power Transformer	Hewlett-Packard	1
5060-6627	X Motor Assembly	Hewlett-Packard	1
5060-6608	Y Motor Assembly	Hewlett-Packard	1
2100-2682	R13 Potentiometer, 10k, 10 turn	Beckman	1
07040-60570	R14 X Slidewire	Hewlett-Packard	1
07040-60550	R14 Y Slidewire	Hewlett-Packard	1
07040-60921	Clamp, Shipping	Hewlett-Packard	1
4040-0879	Cover, Dust, Plastic	Hewlett-Packard	1

Table 6-8. One Year Spare Parts List — Model 7045B

Reference Designation	HP Part No.	CD	Description	Qty.
A2R43,R44	0698-3437	2	Resistor 133 Ω 1% .125W	1
A2Q8	1854-0072	8	Transistor NPN 2N3054 SI PD = 25W	1
A2Q5	1854-0087	5	Transistor NPN SI PD = 360MW	1
A3Q4				
A2Q6	1854-0090	0	Transistor NPN SI PD = 1W	1
A3Q7				
A2Q12	1854-0215	1	Transistor NPN SI PD = 350MW	1
A3Q10				
A1Q7	1854-0370	9	Transistor NPN 2N5294 SI PD = 1.8W	1
A2Q1	1855-0376	7	Transistor — JFET Dual-N-Channel SI	1
A3Q1				
A3CR6,CR7	1901-0044	5	Diode — Switching 50V 50MA	2
A3CR5	1901-0638	3	Diode — FW BROG 100V 4A	1
A3UR8,UR9	1902-0202	9	Diode — ZNR 15V 5% PD = 1W	1
A3UR6,UR7	1902-3110	4	Diode — ZNR 5.9V 2% PD = .4W	1
A2UR4,UR5	1902-3172	8	Diode — ZNR 11V 2% PD = .4W	1
A3UR4,UR5	1902-3191	1	Diode — ZNR 13V 2% PD = .4W	1
A2UR8,UR9	1902-3214	9	Diode — ZNR 16.2V 2% PD = .4W	1
A2R34				
A3R32	0757-0394	0	Resistor 51.1 Ω 1% .125W	1
A2R54,R55				
A3R49,R50	0757-0401	0	Resistor 100 Ω 1% .125W	1
A2Q9	1853-0303	6	Transistor PNP 2N5956 SI PD = 150W	1
A2Q10	1854-0039	7	Transistor NPN 2N3053 SI PD = 1W	1
A2Q8				
	1854-0063	7	Transistor NPN 2N3055 SI PD = 115W	1
	2110-0465	8	Fuse Holder Cap, Bayonet	1
	2110-0470	5	Fuse Holder Body, Bayonet	1
	3101-1261	6	Switch — PB SPDT MOM	1
	3101-1604	1	Switch — TGL, DPDT, ON-N-ON	1
	3101-2269	6	Switch — TGL, SUBMIN DPDT	1
	5080-8117	1	Wiper Assembly — X-Axis	1
	07040-60550	9	Y-Slidewire Assembly	1
	07040-60570	3	X-Slidewire Assembly	1
	07040-60580	5	Casting, Main	1
	07040-60670	4	Block, X Slider	1
	07040-60830	8	Block, Motor	1
	07046-20490	9	Gear, X-Axis Drive	1
	07046-60410	6	Gear Drive Assembly	1
	07046-60440	2	Wiper Assembly	1
	0160-4003	1	Capacitor-Fxd .056W 50 Vdc	1
	0370-3040	9	Knob - Base .5 OB	1
	0370-3002	3	Knob - Base - Conc	1
	0491-0059	0	Solenoid — RTRY	1
	0683-0515	0	Resistor 5.1 Ω 5% .25W	1
	1251-3062	4	Connector; 37-Pin	1

Table 6-9. Reference Designations and Abbreviations

REFERENCE DESIGNATIONS

A.....assembly	E.....miscellaneous electrical part	P.....electrical connector (movable portion); plug	V.....electron tube
AT.....attenuator; isolator; termination	F.....fuse	Q.....transistor; SCR; triode thyristor	VR.....voltage regulator; breakdown diode
B.....fan; motor	FL.....filter	R.....resistor	W.....cable; transmission path; wire
BT.....battery	H.....hardware	RT.....thermistor	X.....socket
C.....capacitor	HY.....circulator	S.....switch	Y.....crystal unit (piezo-electric or quartz)
CP.....coupler	J.....electrical connector (stationary portion)	T.....transformer	Z.....tuned cavity; tuned circuit
CR.....diode; diode thyristor; varactor	K.....jack	TB.....terminal board	
DC.....directional coupler	L.....coil; inductor	TC.....thermocouple	
DL.....delay line	M.....metre	TP.....test point	
DS.....annunciator; signaling device (audible or visual); lamp; LED	MP.....miscellaneous mechanical part	U.....integrated circuit; microcircuit	

ABBREVIATIONS

A.....ampere	COMP.....composition	F.....farad	LC.....inductance-capacitance
ac.....alternating current	COMPL.....complete	FET.....field-effect transistor	LED.....light-emitting diode
ACCESS.....accessory	CONN.....connector	F/F.....flip flop	LF.....low frequency
ADJ.....adjustment	CP.....cadmium plate	FH.....flat head	LG.....long
A/D.....analog-to-digital	CRT.....cathode-ray tube	FIL H.....fillister head	LH.....left hand
AF.....audio frequency	CTL.....complementary transistor logic	FM.....frequency modulation	LIM.....limit
AFC.....automatic frequency control	CW.....continuous wave	FP.....front panel	LIN.....linear taper (used in parts list)
AGC.....automatic gain control	cs.....clockwise	FREQ.....frequency	lin.....linear
AL.....aluminum	cm.....centimetre	FXD.....fixed	LK WASH.....lock washer
ALC.....automatic level control	D/A.....digital-to-analog	g.....gram	LO.....low; local oscillator
AM.....amplitude modulation	dB.....decibel	GE.....germanium	LOG.....logarithmic taper (used in parts list)
AMPL.....amplifier	dBm.....decibel referred to 1 mW	GHz.....gigahertz	log.....logarithm(ic)
APC.....automatic phase control	dc.....direct current	GL.....glass	LPF.....low pass filter
ASSY.....assembly	deg.....degree (temperature interval) or difference	GRD.....ground(ed)	LV.....low voltage
AUX.....auxiliary	°.....degree (plane angle)	H.....henry	m.....metre (distance)
avg.....average	°C.....degree Celsius (centigrade)	h.....hour	mA.....milliampere
AWG.....American wire gauge	°F.....degree Fahrenheit	HET.....heterodyne	MAX.....maximum
BAL.....balance	°K.....degree Kelvin	HEX.....hexagonal	MΩ.....megohm
BCD.....binary coded decimal	DEPC.....deposited carbon	HD.....head	MEG.....meg (10 ⁶) (used in parts list)
BD.....board	DET.....detector	HDW.....hardware	MET FLM.....metal film
BE CU.....beryllium copper	diam.....diameter	HF.....high frequency	MET OX.....metallic oxide
BFO.....beat frequency oscillator	DIA.....diameter (used in parts list)	HG.....mercury	MF.....medium frequency; microfarad (used in parts list)
BH.....binder head	DIFF AMPL.....differential amplifier	HI.....high	MFR.....manufacturer
BKDN.....breakdown	div.....division	HP.....Hewlett-Packard	mg.....milligram
BP.....bandpass	DPDT.....double-pole, double-throw	HPF.....high pass filter	MHz.....megahertz
BPF.....bandpass filter	DR.....drive	HR.....hour (used in parts list)	mH.....millihenry
BRS.....brass	DSB.....double sideband	HV.....high voltage	mho.....mho
BWO.....backward-wave oscillator	DTL.....diode transistor logic	Hz.....Hertz	MIN.....minimum
CAL.....calibrate	DVM.....digital voltmeter	IC.....integrated circuit	min.....minute (time)
ccw.....counter-clockwise	ECL.....emitter coupled logic	ID.....inside diameterminute (plane angle)
CER.....ceramic	EMF.....electromotive force	IF.....intermediate frequency	MINAT.....miniature
CHAN.....channel	EDP.....electronic data processing	IMPG.....impregnated	mm.....millimetre
cm.....centimeter	ELECT.....electrolytic	in.....inch	MOD.....modulator
CMO.....cabinet mount only	ENCAP.....encapsulated	INCD.....incandescent	MOM.....momentary
COAX.....coaxial	EXT.....external	INCL.....include(s)	MOS.....metal-oxide semiconductor
COEF.....coefficient		INP.....input	ms.....millisecond
COM.....common		INS.....insulation	MTG.....mounting
		INT.....internal	MTR.....metre (indicating device)
		kg.....kilogram	
		kHz.....kilohertz	
		kΩ.....kilohm	
		kV.....kilovolt	
		lb.....pound	

NOTE

All abbreviations in the parts list will be in upper case.

Table 6-9. Reference Designations and Abbreviations (Continued)

mV.....millivolt	OP AMPL.....operational amplifier	RC.....resistance-capacitance	SQ.....square
mVac.....millivolt, ac	OPT.....option	RECT.....rectifier	SWR.....standing-wave ratio
mVdc.....millivolt, dc	OSC.....oscillator	REF.....reference	SYNC.....synchronize
mVpk.....millivolt, peak	OX.....oxide	REG.....regulated	T.....timed (slow-blow fuse)
mVp-p.....millivolt, peak-to-peak	oz.....ounce	REPL.....replaceable	TA.....tantalum
mVrms.....millivolt, rms	Ωohm	RF.....radio frequency	TC.....temperature compensating
mW.....milliwatt	P.....peak (used in parts list)	RFI.....radio frequency interference	TD.....time delay
MUX.....multiplex	PAM.....pulse-amplitude modulation	RH.....round head; right hand	TERM.....terminal
MY.....mylar	PC.....printed circuit	RLC.....resistance-inductance-capacitance	TFT.....thin-film transistor
μ A.....microampere	PCM.....pulse-code modulation; pulse-count modulation	RMO.....rack mount only	TGL.....toggle
μ F.....microfarad	PDM.....pulse-duration modulation	rms.....root-mean-square	THD.....thread
μ H.....microhenry	pF.....picofarad	RND.....round	THRU.....through
μ mho.....micromho	PIV.....peak inverse voltage	ROM.....read only memory	TI.....titanium
μ s.....microsecond	pk.....peak	R & P.....rack and panel	TOL.....tolerance
μ V.....microvolt	PNP.....positive-negative-positive	RWV.....reverse working voltage	TRIM.....trimmer
μ Vac.....microvolt, ac	P/O.....part of	S.....scattering parameter	TSTR.....transistor
μ Vdc.....microvolt, dc	POLY.....polystyrene	s.....second (time)	TTL.....transistor-transistor logic
μ Vpk.....microvolt, peak	PORC.....porcelain	".....second (plane angle)	U.....micro (10^6) (used in parts list)
μ Vp-p.....microvolt, peak-to-peak	POS.....positive; position(s) (used in parts list)	S-B.....slow-blow (fuse) (used in parts list)	UF.....microfarad (used in parts list)
μ Vrms.....microvolt, rms	POSN.....position	SCR.....silicon controlled rectifier; screw	UHF.....ultrahigh frequency
μ W.....microwatt	POT.....potentiometer	SE.....selenium	UNREG.....unregulated
nA.....nanoampere	p-p.....peak-to-peak	SECT.....sections	V.....volt
NC.....no connection	PP.....peak-to-peak (used in parts list)	SEMICON.....semiconductor	VA.....voltampere
N/C.....normally closed	PPM.....pulse-position modulation	SHF.....superhigh frequency	Vac.....volts, ac
NEG.....negative	PREAMPL.....preamplifier	SI.....silicon	VAR.....variable
nF.....nanofarad	PRF.....pulse-repetition frequency	SIL.....silver	Vdc.....volts, dc
NI PL.....nickel plate	PRR.....pulse repetition rate	SL.....slide	VDCW.....volts, dc, working (used in parts list)
N/O.....normally open	ps.....picosecond	SNR.....signal-to-noise ratio	Vpk.....volts, peak
NOM.....nominal	PT.....point	SPDT.....single-pole, double-throw	Vp-p.....volts, peak-to-peak
NORM.....normal	PTM.....pulse-time modulation	SPG.....spring	Vrms.....volts, rms
NPN.....negative-positive-negative	PWN.....pulse-width modulation	SR.....split ring	VTVM.....vacuum-tube voltmeter
NPN.....negative-positive zero (zero temperature coefficient)	PWV.....peak working voltage	SPST.....single-pole, single-throw	V(X).....volts, switched
NRFR.....not recommended for field replacement		SSB.....single sideband	W.....watt
NSR.....not separately replaceable		SST.....stainless steel	W/.....with
ns.....nanosecond		STL.....steel	WIV.....working inverse voltage
nW.....nanowatt			WW.....wirewound
OBD.....order by description			W/O.....without
OD.....outside diameter			Z ₀characteristic impedance
OH.....oval head			

NOTE

All abbreviations in the parts list will be in upper case.

MULTIPLIERS

Abbreviation	Prefix	Multiple
T	tera	10^{12}
G	giga	10^9
M	mega	10^6
k	kilo	10^3
da	deka	10
d	deci	10^{-1}
c	centi	10^{-2}
m	milli	10^{-3}
μ	micro	10^{-6}
n	nano	10^{-9}
p	pico	10^{-12}
f	femto	10^{-15}
a	atto	10^{-18}

Table 6-10. Code List of Manufacturers

Mfr. No.	Manufacturer Name	Address	Zip Code
01121	Allen-Bradley Co.	Milwaukee, WI	53204
01295	Texas Instruments Inc. Semiconductor Components Division	Dallas, TX	75222
01885	Spectrol Electronics	City of Industry, CA	91745
01928	RCA Corp. Solid State Division	Somerville, NJ	08876
02114	Ferroxcube Corp.	Saugerties, NY	12477
04486	ITT Cannon	Santa Ana, CA	92702
04713	Motorola Semiconductor Products Inc.	Phoenix, AZ	85062
05027	Ledex Corp.	Dayton, OH	45402
05057	Switchcraft	Chicago, IL	60630
07263	Fairchild Camera & Instrument Corp. Semiconductor Division	Mountain View, CA	94042
09023	Cornell-Dubilier Electric Division Federal Pacific Electric Co.	Sanford, NC	27330
14936	General Instrument Corp. Semiconductor Products	Hicksville, NY	11802
15818	Teledyne Semiconductor	Mountain View, CA	94043
19701	Mepco/Electra Corp.	Mineral Wells, TX	76067
24046	Transitron Electronic Corp.	Wakefield, MA	01880
24546	Corning Glass Works (Bradford)	Bradford, PA	16701
27167	Corning Glass Works (Wilmington)	Wilmington, NC	28401
28480	Hewlett-Packard Co.	Palo Alto, CA	94304
32997	Bourns Inc. Trimpot Products Division	Riverside, CA	92507
56289	Sprague Electric Co.	N. Adams, MA	01247
73138	Beckman Instruments Inc. Helipot Division	Fullerton, CA	92634
75042	TRW Inc. Philadelphia Division	Philadelphia, PA	19108
75915	Littlefuse Inc.	Des Plaines, IL	60016
84411	TRW Inc. Capacitor Division	Ogallala, NE	69153
95987	Weckesser Co. Inc.	Chicago, IL	60641
98291	Sealectro Corp.	Mamaroneck, NY	10544



SECTION VII

TROUBLESHOOTING

7-1. INTRODUCTION.

7-2. CONTENT.

7-3. This section contains instructions for troubleshooting the Models 7044B and 7045B. Component location photographs, schematics, and a troubleshooting table are supplied to aid in troubleshooting.

7-4. TROUBLESHOOTING.

7-5. REQUIREMENTS.

7-6. Troubleshooting should be performed in a logical manner. The concept of bracketing should be established

such as determining which circuits or sections are not operating or are operating abnormally. This is generally the fastest method to locate trouble in a closed loop circuit. When troubleshooting the individual model, utilize the photographs and schematic presented in the subsection pertaining to that model. See Figures 7-1 through 7-14.

7-7. TROUBLESHOOTING INDEX.

7-8. The troubleshooting index lists other possible malfunctions, suspected causes, and remedies. Use component location photographs and schematics for backup when searching out a problem area. Tables 7-10 through 7-15 are supplied for troubleshooting models 7044B/7045B.

Table 7-1. Power Supply PCA Parts List

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	07044-60202	2	1	PCA=POWER SUPPLY	28480	07044-60202
A1	07044-60203	3	1	PCA=POWER SUPPLY OPT. 002)	28480	07044-60203
A1C1	0150-0012	3	4	CAPACITOR-FXD .01UF +-20% 1KVDC CER	56289	C023A102J103MS38
A1C2	0150-0012	3		CAPACITOR-FXD .01UF +-20% 1KVDC CER	56289	C023A102J103MS38
A1C3	0180-2240	6	2	CAPACITOR-FXD 2400UF+75-10% 25VDC AL	56289	39D248G025JL6-D88
A1C4	0180-19A5	1	1	CAPACITOR-FXD 500UF+75-10% 30VDC AL (OPT. 002)	56289	39D307G030FLL-D88
A1C5	0180-2240	6		CAPACITOR-FXD 2400UF+75-10% 25VDC AL	56289	39D248G025JL6-D88
A1C6	0160-0820	2	2	CAPACITOR-FXD .05UF +80-20% 25VDC CER	28480	0160-0820
A1C7	0160-0820	2		CAPACITOR-FXD .05UF +80-20% 25VDC CER	28480	0160-0820
A1C8	0150-0012	3		CAPACITOR-FXD .01UF +-20% 1KVDC CER	56289	C023A102J103MS38
A1C9	0150-0012	3		CAPACITOR-FXD .01UF +-20% 1KVDC CER	56289	C023A102J103MS38
A1CR1	1901-0743	1	5	DIODE=PIR RECT 1N4004 400V 1A DO-41	01295	1N4004
A1CR2	1901-0743	1		DIODE=PIR RECT 1N4004 400V 1A DO-41	01295	1N4004
A1CR3	1901-0743	1		DIODE=PIR RECT 1N4004 400V 1A DO-41	01295	1N4004
A1CR4	1901-0743	1		DIODE=PIR RECT 1N4004 400V 1A DO-41	01295	1N4004
A1CR5	1901-0849	8	4	DIODE=PIR RECT 1N4007 1KV 1A DO-41	14936	1N4007
A1CR6	1901-0849	8		DIODE=PIR RECT 1N4007 1KV 1A DO-41	14936	1N4007
A1CR7	1901-0743	1		DIODE=PIR RECT 1N4004 400V 1A DO-41 (OPT. 002)	01295	1N4004
A1CR8	1901-0743	1		DIODE=PIR RECT 1N4004 400V 1A DO-41	01295	1N4004
A1CR9	1901-0849	8		DIODE=PIR RECT 1N4007 1KV 1A DO-41	14936	1N4007
A1CR10	1901-0849	8		DIODE=PIR RECT 1N4007 1KV 1A DO-41	14936	1N4007
A1E1-A1E36				NOT ASSIGNED		
A1E37	1205-0282	7	1	HEAT SINK PLSTC=PIR-CS	28480	1205-0282
A1E38	1400-0482	3	2	CABLE TIE .062-3=DIA .14=WD NYL	28480	1400-0482
A1E39	1400-0482	3		CABLE TIE .062-3=DIA .14=WD NYL	28480	1400-0482
A1E40	2110-0269	0	2	FUSEHOLDER=CLIP TYPE.25D=FUSE	28480	2110-0269
A1M1	2200-0139	4	1	SCREW=MACH 4-40 .25=IN LG PAN=HD=POZI	00000	ORDER BY DESCRIPTION
A1M2	2260-0009	3	1	NUT=HEX=M/LKMR 4=20=THD .094=IN=THK	00000	ORDER BY DESCRIPTION
A1Q1	1854-0071	7	2	TRANSISTOR NPN 3I PD=300MW FT=200MHZ (OPT. 002)	28480	1854-0071
A1Q2	1854-0370	9	2	(OPT. 002)	01928	2N5294
A1Q3	1854-0370	9		TRANSISTOR NPN 2N5294 3I PD=1.5W	01928	2N5294
A1Q4	1854-0071	7		TRANSISTOR NPN 3I PD=300MW FT=200MHZ	28480	1854-0071
A1R1	0686-3945	2	1	RESISTOR 390K 5% .5W CC TC=0+282	01121	E83945
A1R2	0698-8754	6	2	RESISTOR 10M 1% .25W C TC=0+150	01121	CC1005F
A1R3	0698-8754	6		RESISTOR 10M 1% .25W C TC=0+150	01121	CC1005F
A1R4	0698-3615	8	1	RESISTOR 47 5% 2W MO TC=0+200	27167	FP42-2-T00-47R0-J
A1R5	0757-0280	3	2	RESISTOR 1K 1% .125W F TC=0+100	24546	C4-1/8-T0-1001-F
A1R6	0698-3403	2	3	RESISTOR 348 1% .5W F TC=0+100	28480	0698-3403
A1R7	0698-4002	9	2	RESISTOR 5K 1% .125W F TC=0+100	24546	C4-1/8-T0-5001-F
A1R8	0757-0428	1		RESISTOR 1.62K 1% .125W F TC=0+100	24546	C4-1/8-T0-1621-F
A1R9	0811-1676	9	2	RESISTOR 6.8 5% 2W PH TC=0+400	75042	8WH2-6R8-J
A1R10	0811-1676	9		RESISTOR 6.8 5% 2W PH TC=0+400	75042	8WH2-6R8-J
A1R11	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+100	24546	C4-1/8-T0-1001-F
A1R12	0698-4002	9	1	RESISTOR 5K 1% .125W F TC=0+100	24546	C4-1/8-T0-5001-F
A1R13	0698-3403	2		RESISTOR 348 1% .5W F TC=0+100	28480	0698-3403
A1R14	0698-3403	2		RESISTOR 348 1% .5W F TC=0+100	28480	0698-3403
A1R15	0757-0428	1	2	RESISTOR 1.62K 1% .125W F TC=0+100	24546	C4-1/8-T0-1621-F
A1R16	0698-3453	2	2	RESISTOR 196K 1% .125W F TC=0+100	24546	C4-1/8-T0-1963-F
A1R17	0698-3453	2		RESISTOR 196K 1% .125W F TC=0+100	24546	C4-1/8-T0-1963-F
A1U1	1820-0269	4	1	IC GATE TTL NAND QUAD 2=INP	01295	SN7403N
A1U2	1826-0122	0	1	IC 7805 V RGLTR T0=220	07263	7805UC

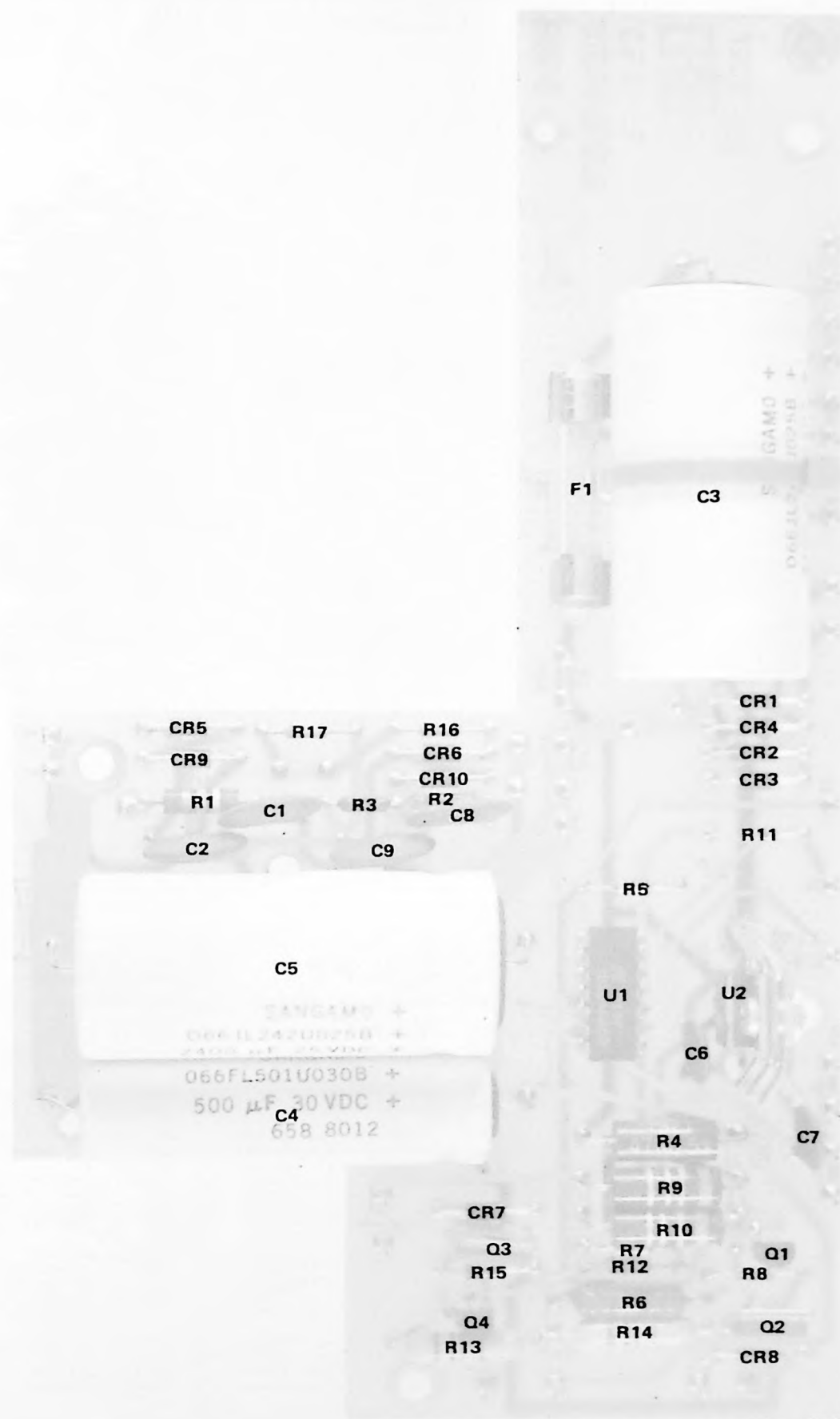
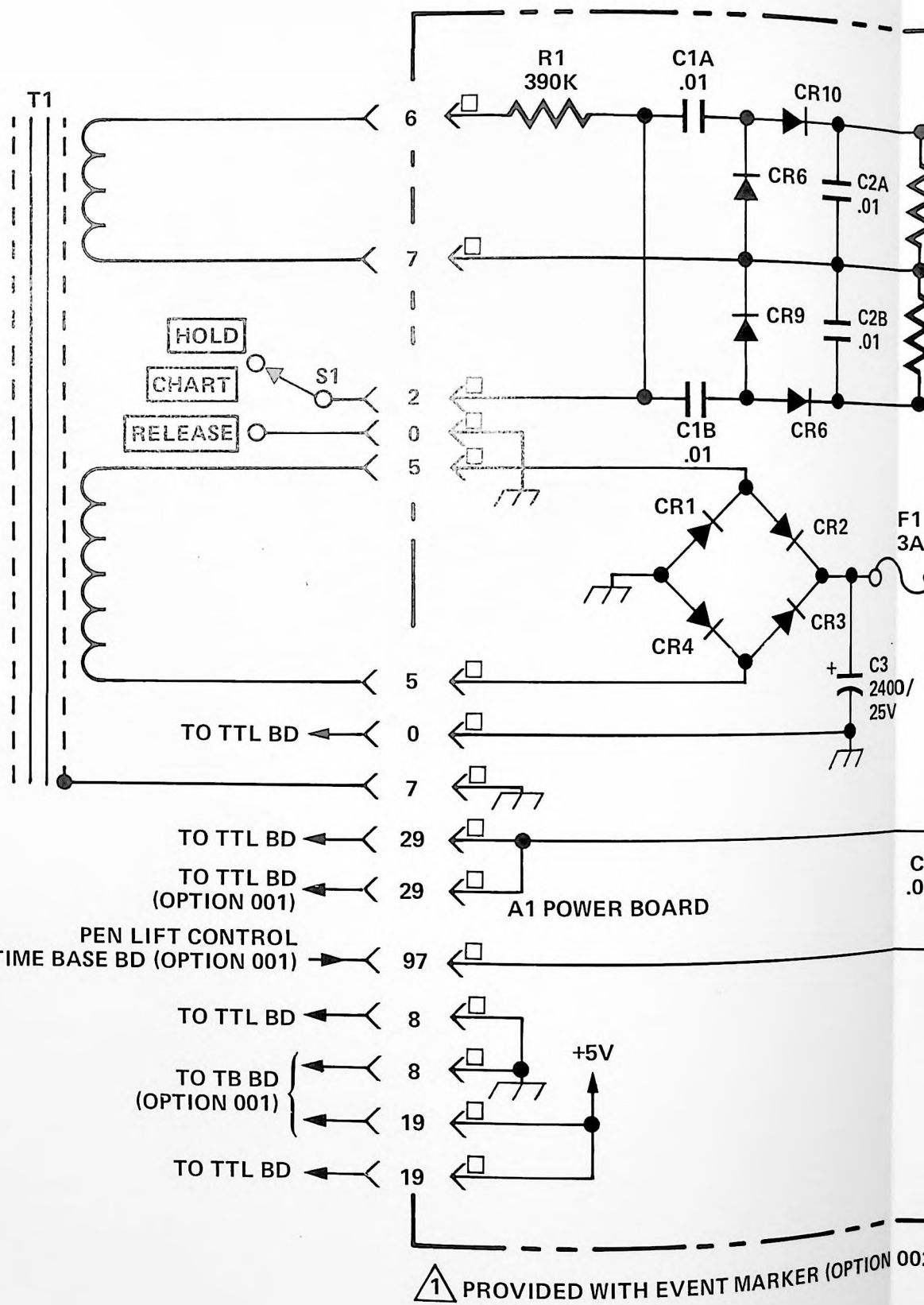


Figure 7-1. Power Supply Circuit Board — Model 7044B/7045B



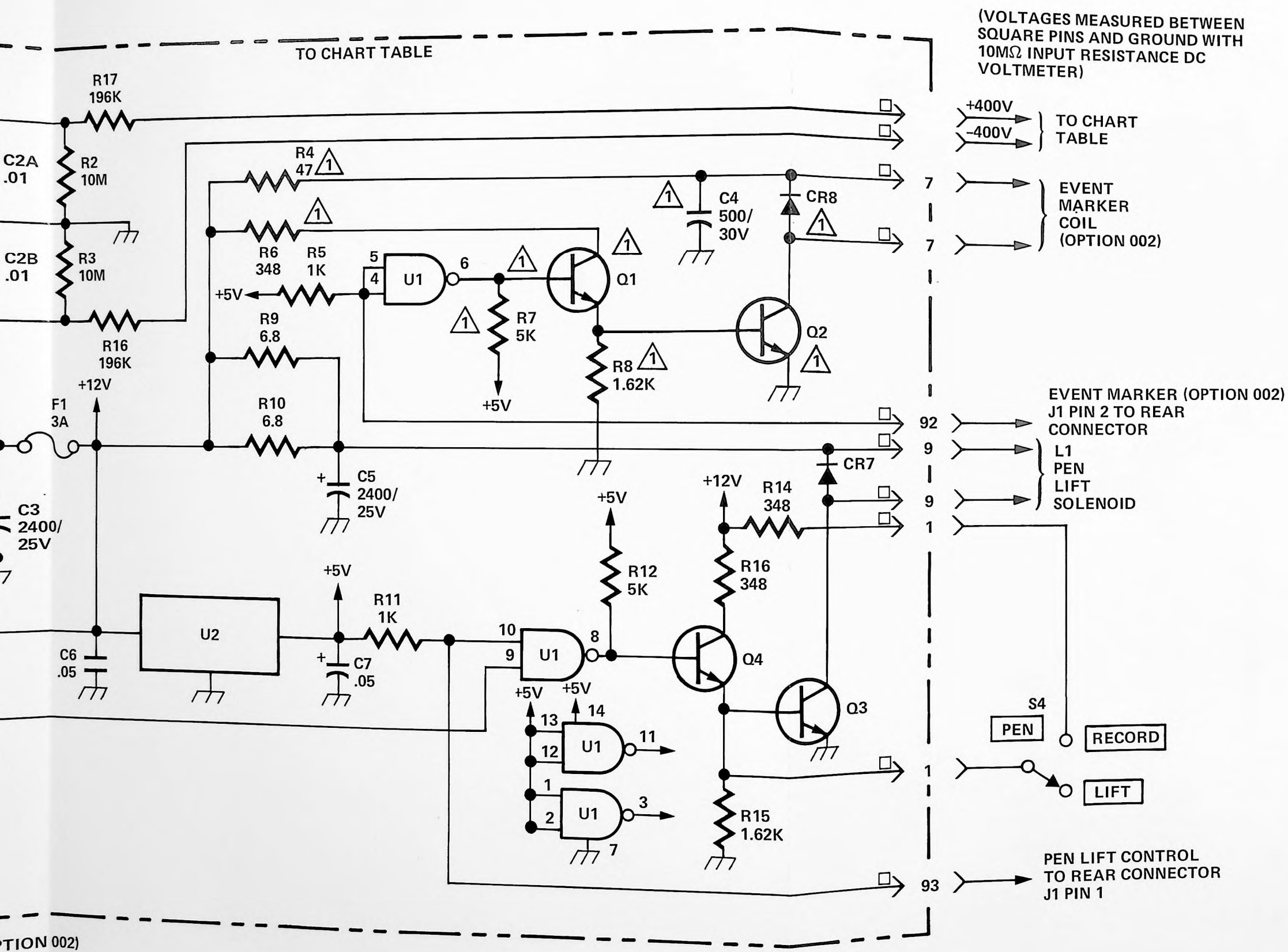
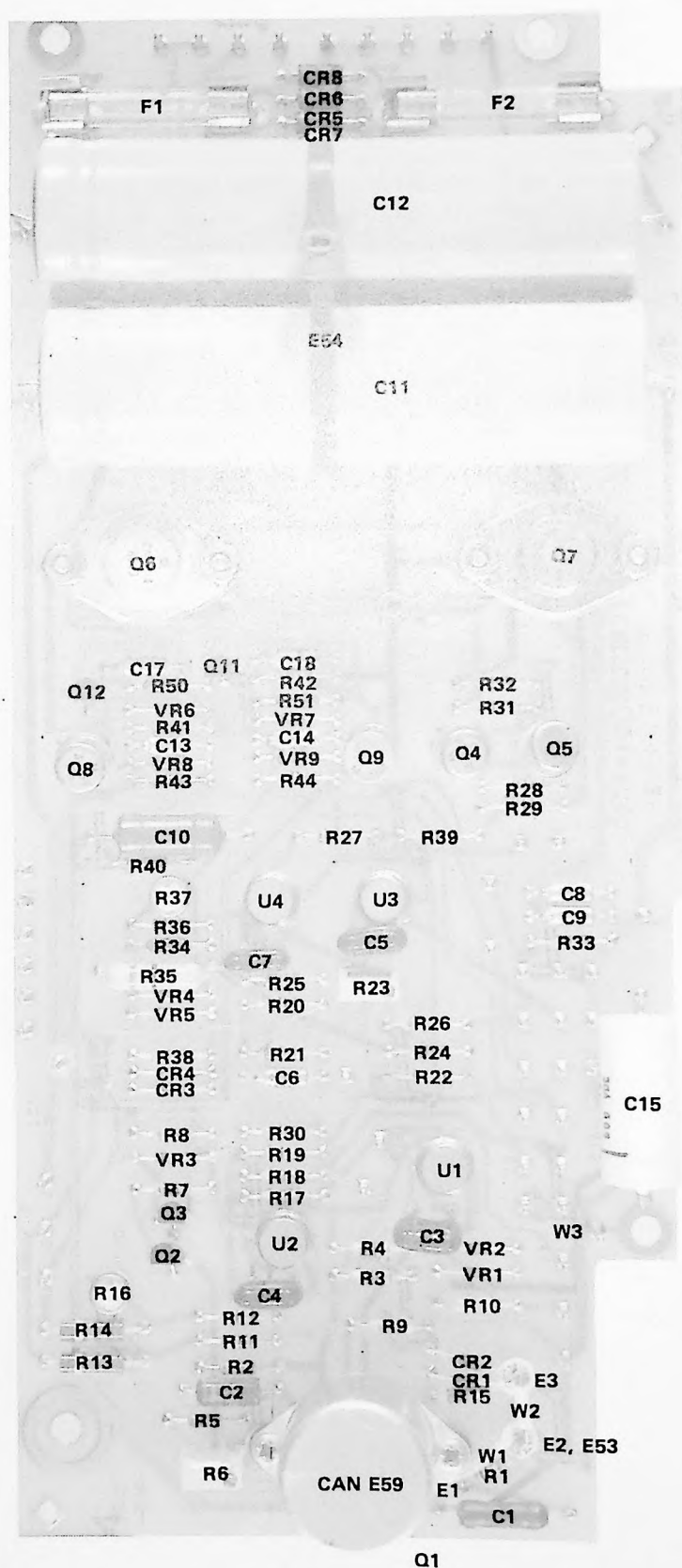
Figure 7-2. Power Supply Schematic
Model 7044B/7045B

Table 7-2. Y-Axis Amplifier PCA A2 Parts List — 7044B (Sheet 1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2	07044-60500	3	1	PCA=Y-AXIS AMPLIFIER (ENGLISH)	28480	07044-60500
A2	07044-60580	9		PCA=Y-AXIS AMPLIFIER (METRIC)	28480	07044-60580
A2C1	0160-0161	4	1	CAPACITOR-FXC .01UF +-10% 200VDC POLYE	28480	0160-0161
A2C2	0160-0157	8	1	CAPACITOR-FXC 4700PF +-10% 200VDC POLYE	28480	0160-0157
A2C3	0160-2207	3	3	CAPACITOR-FXC 300PF +-5% 300VDC MICA	28480	0160-2207
A2C4	0160-2207	3		CAPACITOR-FXC 300PF +-5% 300VDC MICA	28480	0160-2207
A2C5	0160-2207	3		CAPACITOR-FXC 300PF +-5% 300VDC MICA	28480	0160-2207
A2C6	0180-1735	2	1	CAPACITOR-FXD .22UF+-10% 35VDC TA	56289	1500224X9035A2
A2C7	0160-2199	2	1	CAPACITOR-FXD 30PF +-5% 300VDC MICA	28480	0160-2199
A2C8	0180-0197	8	2	CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	1500225X9020A2
A2C9	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	1500225X9020A2
A2C10	0160-0165	8	1	CAPACITOR-FXD .056UF +-10% 200VDC POLYE	28480	0160-0165
A2C11	0180-2340	7	2	CAPACITOR-FXD 3600UF+75-10% 30VDC AL	56289	390368G030JT6-D3B
A2C12	0180-2340	7		CAPACITOR-FXD 3600UF+75-10% 30VDC AL	56289	390368G030JT6-D3B
A2C13	0180-0291	3	4	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A2C14	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A2C15	0160-0819	9	1	CAPACITOR-FXC .047UF +-10% 600VDC POLYE	09023	WMF-6347
A2C16				NOT ASSIGNED		
A2C17	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A2C18	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A2CR1	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A2CR2	1901-0376	6		DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A2CR3	1901-0044	5	2	DIODE-SWITCHING 50V 50MA 6NS	28480	1901-0044
A2CR4	1901-0044	5		DIODE-SWITCHING 50V 50MA 6NS	28480	1901-0044
A2CR5	1901-0838	5	4	DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A2CR6	1901-0838	5		DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A2CR7	1901-0838	5		DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A2CR8	1901-0838	5		DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A2E1	0340-0060	4	3	TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A2E2	0340-0060	4		TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A2E3	0340-0060	4		TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A2E4	0340-0140	1	47	INSULATOR-XSTR MICA	28480	0340-0140
A2E5	0340-0140	1		INSULATOR-XSTR MICA	28480	0340-0140
A2E6			1	INSULATOR-XSTR MICA	28480	0340-0140
A2E50	0340-0140	1		INSULATOR-XSTR MICA	28480	0340-0140
A2E51				NOT ASSIGNED		
A2E52				CONNECTOR-SGL CONT PIN 1.14-MM-B3C-SZ 30	28480	1251-0600
A2E53	1251-0600	0	1	CONNECTOR-SGL CONT PIN 1.14-MM-B3C-SZ 30	28480	1251-0600
A2E54	1400-0482	3	1	CABLE TIE .062-3-DIA .14-OD NYL	28480	1400-0482
A2E55	2110-0269	0	3	FUSEHOLDER-CLIP TYPE.250-FUSE	28480	2110-0269
A2E56	2110-0269	0		FUSEHOLDER-CLIP TYPE.250-FUSE	28480	2110-0269
A2E58	2110-0269	0		FUSEHOLDER-CLIP TYPE.250-FUSE	28480	2110-0269
A2E59	7100-1163	9	1	CAN-ROUND	28480	7100-1163
A2E60	07040-20530	1	3	WASHER-SHOULDERED	28480	07040-20530
A2E61	07040-20530	1		WASHER-SHOULDERED	28480	07040-20530
A2E63	07040-20530	1		WASHER-SHOULDERED	28480	07040-20530
A2E64	07041-00010	1	1	HEAT SINK	28480	07041-00010
A2F1	2110-0043	8	2	FUSE 1.5A 250V NTD 1.25X.25 UL	28480	2110-0043
A2F2	2110-0043	8		FUSE 1.5A 250V NTD 1.25X.25 UL	28480	2110-0043
A2H1	0590-0199	9	6	NUT-HEX-H/LKAR 4-40-THD .094-IN-TMK	00000	ORDER BY DESCRIPTION
A2H2	0590-0199	9		NUT-HEX-H/LKAR 4-40-THD .094-IN-TMK	00000	ORDER BY DESCRIPTION
A2H3	0590-0199	9		NUT-HEX-H/LKAR 4-40-THD .094-IN-TMK	00000	ORDER BY DESCRIPTION
A2H4	0590-0199	9		NUT-HEX-H/LKAR 4-40-THD .094-IN-TMK	00000	ORDER BY DESCRIPTION
A2H5	0590-0199	9		NUT-HEX-H/LKAR 4-40-THD .094-IN-TMK	00000	ORDER BY DESCRIPTION
A2H6	0590-0199	9		NUT-HEX-H/LKAR 4-40-THD .094-IN-TMK	00000	ORDER BY DESCRIPTION
A2H7	2190-0182	4	2	WASHER-FL NM NO. 3 .11-IN-ID .25-IN-OD	28480	2190-0182
A2H8	2190-0182	4		WASHER-FL NM NO. 3 .11-IN-ID .25-IN-OD	28480	2190-0182
A2H9	2200-0141	8	2	SCREW-PACH 4-40 .312-IN-LG PAK-HD-POZI	00000	ORDER BY DESCRIPTION
A2H10	2200-0141	8		SCREW-PACH 4-40 .312-IN-LG PAK-HD-POZI	00000	ORDER BY DESCRIPTION
A2H11	2200-0523	0	4	SCREW-PACH 4-40 .562-IN-LG PAK-HD-PHL	00000	ORDER BY DESCRIPTION
A2H12	2200-0523	0		SCREW-PACH 4-40 .562-IN-LG PAK-HD-PHL	00000	ORDER BY DESCRIPTION
A2H13	2200-0523	0		SCREW-PACH 4-40 .562-IN-LG PAK-HD-PHL	00000	ORDER BY DESCRIPTION
A2H14	2200-0523	0		SCREW-PACH 4-40 .562-IN-LG PAK-HD-PHL	00000	ORDER BY DESCRIPTION
A2Q1	1853-0012	4	2	TRANSISTOR PNP 2N2904A SI TO-39 PD=600MHZ	01295	2N2904A
A2Q2	1854-0071	7	2	TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854-0071
A2Q3	1854-0071	7		TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854-0071
A2Q4	1854-0039	7	2	TRANSISTOR NPN 2N3053 SI TO-39 PD=1W	01928	2N3053
A2Q5	1853-0012	4		TRANSISTOR PNP 2N2904A SI TO-39 PD=600MHZ	01295	2N2904A
A2Q6	1854-0072	8	1	TRANSISTOR NPN 2N3054 SI TO-66 PD=25W	01928	2N3054
A2Q7	1853-0303	6	1	TRANSISTOR PNP 2N5956 SI TO-66 PD=40W	04713	2N5956
A2Q8	1854-0039	7		TRANSISTOR NPN 2N3053 SI TO-39 PD=1W	01928	2N3053
A2Q9	1853-0041	9	1	TRANSISTOR PNP SI TO-39 PD=1W FT=60MHZ	28480	1853-0041
A2Q10				NOT ASSIGNED		

Table 7-2. Y-Axis Amplifier PCA A2 Parts List — 7044B (Sheet 2 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2Q11	1853-0036	2	1	TRANSISTOR PNP SI PD=310mV FT=250mHZ	28480	1853-0036
A2Q12	1854-0215	1	1	TRANSISTOR NPN SI PD=350mV FT=300mHZ	04713	2N3904
A2R1	0757-0280	3	5	RESISTOR 1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=1001-F
A2R2	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=3481-F
A2R3	0698-6977	1	2	RESISTOR 30K .1% .125W F TC=0+/-25	28480	0698-6977
A2R4	0698-6977	1	1	RESISTOR 30K .1% .125W F TC=0+/-25	28480	0698-6977
A2R5	0757-0398	4	1	RESISTOR 75 1% .125W F TC=0+/-100	24546	C4=1/8-T0=75R0-F
A2R6	2100-3288	8	1	RESISTOR-TRMR 5n 20% C TOP=ADJ 17-TRN	28480	2100-3288
A2R7	0757-0444	1	1	RESISTOR 12.1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=1212-F
A2R8	0757-0278	9	1	RESISTOR 1.78K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=1781-F
A2R9	0698-8747	7	1	RESISTOR 833.3 .1% .125W F TC=0+/-25	28480	0698-8747
A2R10	0698-8756	8	1	RESISTOR 166.7 .1% .125W F TC=0+/-25	28480	0698-8756
A2R11	0757-0442	9	2	RESISTOR 10K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=1002-F
A2R12	0757-0442	9	1	RESISTOR 10K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=1002-F
A2R13	0698-5846	1	2	RESISTOR 13W 5% .5W CC TC=0+1059	01121	EB1365
A2R14	0698-5846	1	1	RESISTOR 13W 5% .5W CC TC=0+1059	01121	EB1365
A2R15	0683-1065	7	1	RESISTOR 10W 5% .25W CC TC=-900/+1100	01121	CB1065
A2R16	2100-2030	6	1	RESISTOR-TRMR 20K 10% C TOP=ADJ 1-TRN	73138	82PR20K
A2R17	0698-6619	8	2	RESISTOR 15K .1% .125W F TC=0+/-25	28480	0698-6619
A2R18	0698-6619	8	1	RESISTOR 15K .1% .125W F TC=0+/-25	28480	0698-6619
A2R19	0757-0440	7	2	RESISTOR 7.5K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=7501-F
A2R20	0757-0439	4	1	RESISTOR 6.81K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=6811-F
A2R21	0698-7494	9	1	RESISTOR 34.8K 1% .125W F TC=0+/-25	19701	MF4C1/8-T9=3482-F
A2R22	0698-5556	0	1	RESISTOR 3.3K 1% .125W F TC=0+/-25	28480	0698-5556
A2R23	0698-7322	2	1	RESISTOR 4.25K .25% .125W F TC=0+/-25	19701	MF4C1/8-T9=4251-C
A2R24	2100-3296	8	1	RESISTOR-TRMR 1K 10% C TOP=ADJ 17-TRN	28480	2100-3296
A2R25	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=1001-F
A2R26	0757-0279	0	3	RESISTOR 3.16K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=3161-F
A2R27	0698-7646	3	1	RESISTOR 31.6K 1% .125W F TC=0+/-25	19701	MF4C1/8-T9=3162-F
A2R28	0757-0283	6	1	RESISTOR 2K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=2001-F
A2R29	0698-3437	2	2	RESISTOR 133 1% .125W F TC=0+/-100	24546	C4=1/8-T0=133R-F
A2R30	0698-3437	2	1	RESISTOR 133 1% .125W F TC=0+/-100	24546	C4=1/8-T0=133R-F
A2R31	0757-0440	7	1	RESISTOR 7.5K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=7501-F
A2R32	0757-0346	2	3	RESISTOR 10 1% .125W F TC=0+/-100	24546	C4=1/8-T0=10R0-F
A2R33	0757-0346	2	1	RESISTOR 10 1% .125W F TC=0+/-100	24546	C4=1/8-T0=10R0-F
A2R34	0757-0401	0	3	RESISTOR 100 1% .125W F TC=0+/-100	24546	C4=1/8-T0=101-F
A2R35	0757-0137	9	1	RESISTOR 750K 1% .5W F TC=0+/-100	28480	0757-0137
A2R36	0757-0416	7	1	RESISTOR 511 1% .125W F TC=0+/-100	24546	C4=1/8-T0=511R-F
A2R37	2100-2497	9	1	RESISTOR-TRMR 2K 10% C TOP=ADJ 1-TRN	73138	82PR2K
A2R38	0757-0394	0	1	RESISTOR 51.1 1% .125W F TC=0+/-100	24546	C4=1/8-T0=511R-F
A2R39	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=1001-F
A2R40	0698-3266	5	1	RESISTOR 237K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=2373-F
A2R41	0757-0279	0	1	RESISTOR 3.16K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=3161-F
A2R42	0757-0279	0	1	RESISTOR 3.16K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=3161-F
A2R43	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=1001-F
A2R44	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0=1001-F
A2R45				NOT ASSIGNED		
A2R49				RESISTOR 100 1% .125W F TC=0+/-100	24546	C4=1/8-T0=101-F
A2R50	0757-0401	0		RESISTOR 100 1% .125W F TC=0+/-100	24546	C4=1/8-T0=101-F
A2R51	0757-0401	0		RESISTOR 100 1% .125W F TC=0+/-100	24546	C4=1/8-T0=101-F
A2U1	1826-0059	2	4	IC OP AMP GP T0-99 PKG	01295	LM201AL
A2U2	1826-0059	2		IC OP AMP GP T0-99 PKG	01295	LM201AL
A2U3	1826-0059	2		IC OP AMP GP T0-99 PKG	01295	LM201AL
A2U4	1826-0059	2		IC OP AMP GP T0-99 PKG	01295	LM201AL
A2VR1	1902-0025	4	2	DIODE-ZNR 10V 5% D0-35 PD=.4W TC=+.06%	28480	1902-0025
A2VR2	1902-0025	4		DIODE-ZNR 10V 5% D0-35 PD=.4W TC=+.06%	28480	1902-0025
A2VR3	1902-0041	4	1	DIODE-ZNR 5.11V 5% D0-35 PD=.4W	28480	1902-0041
A2VR4	1902-3150	2	2	DIODE-ZNR 9.09V 2% D0-35 PD=.4W	28480	1902-3150
A2VR5	1902-3150	2		DIODE-ZNR 9.09V 2% D0-35 PD=.4W	28480	1902-3150
A2VR6	1902-0202	9	2	DIODE-ZNR 15V 5% D0-15 PD=1W TC=+.057%	28480	1902-0202
A2VR7	1902-0202	9		DIODE-ZNR 15V 5% D0-15 PD=1W TC=+.057%	28480	1902-0202
A2VR8	1902-0777	3	2	DIODE-ZNR 1N825 6.2V 5% D0-7 PD=.4W	04713	1N825
A2VR9	1902-0777	3		DIODE-ZNR 1N825 6.2V 5% D0-7 PD=.4W	04713	1N825
A2W1	8151-0013	4	1	WIRE 22AWG 1X22	28480	8151-0013
A2W2	8150-0355	5	1	WIRE 22AWG Y 42V TFE 19X34 105C	28480	8150-0355
A2W3	8159-0005	0	1	WIRE 22AWG N PVC 1X22 80C	28480	8159-0005



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NOTE: HEAT SINKS REMOVED FOR CLARITY.

Figure 7-3. Y-Axis DC Amplifier Circuit Board – 7044B

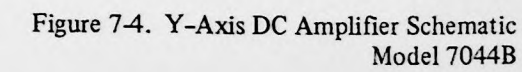
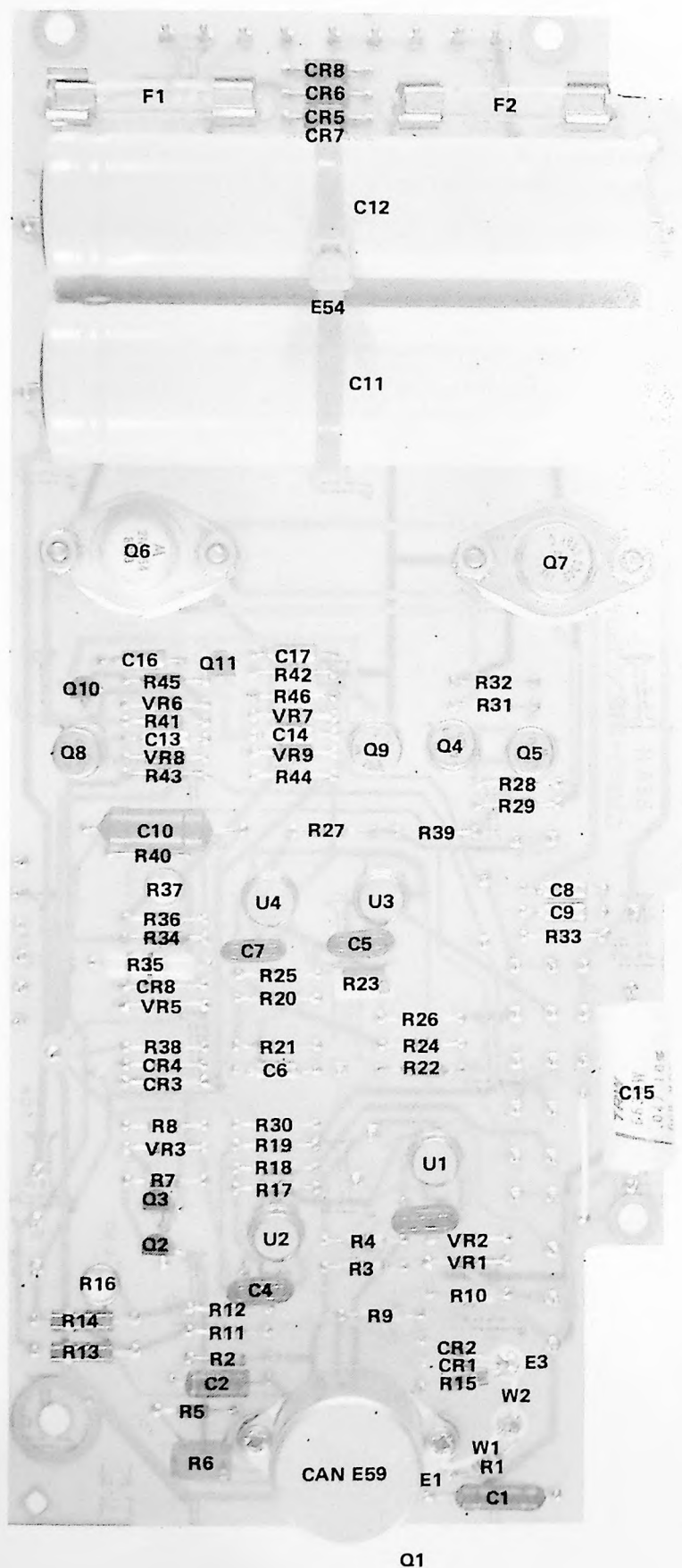


Table 7-3. X-Axis Amplifier PCA A3 Parts List (Sheet 1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3	07044-60100	9	1	PCA-X-AXIS AMPLIFIER (ENGLISH)	28480	07044-60100
A3	07044-60590	1		PCA-X-AXIS AMPLIFIER (METRIC)	28480	07044-60590
A3C1	0160-0161	4	1	CAPACITOR-FXD .01UF +-10% 200VDC POLYE	28480	0160-0161
A3C2	0160-0157	8	1	CAPACITOR-FXD 4700PF +-10% 200VDC POLYE	28480	0160-0157
A3C3	0160-2207	3	3	CAPACITOR-FXD 300PF +-5% 300VDC MICA	28480	0160-2207
A3C4	0160-2207	3		CAPACITOR-FXD 300PF +-5% 300VDC MICA	28480	0160-2207
A3C5	0160-2207	3		CAPACITOR-FXD 300PF +-5% 300VDC MICA	28480	0160-2207
A3C6	0180-2208	6	1	CAPACITOR-FXD 220UF+-10% 10VDC TA	56289	1500227X901092
A3C7	0180-2199	2	1	CAPACITOR-FXD 30PF +-5% 300VDC MICA	28480	0160-2199
A3C8	0180-0197	8	2	CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	1500225X9020A2
A3C9	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	1500225X9020A2
A3C10	0160-0165	8	1	CAPACITOR-FXD .056UF +-10% 200VDC POLYE	28480	0160-0165
A3C11	0180-2340	7	2	CAPACITOR-FXD 3600UF+75-10% 30VDC AL	56289	3903680030JT6-D80
A3C12	0180-2340	7		CAPACITOR-FXD 3600UF+75-10% 30VDC AL	56289	3903680030JT6-D80
A3C13	0180-0291	3	4	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A3C14	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A3C15	0160-0819	9	1	CAPACITOR-FXD .047UF +-10% 600VDC POLYE	09023	WMP-6847
A3C16	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A3C17	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A3CR1	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A3CR2	1901-0376	6		DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A3CR3	1901-0044	5	2	DIODE-SWITCHING 50V 50MA 6NS	28480	1901-0044
A3CR4	1901-0044	5		DIODE-SWITCHING 50V 50MA 6NS	28480	1901-0044
A3CR5	1901-0838	5	4	DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A3CR6	1901-0838	5		DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A3CR7	1901-0838	5		DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A3CR8	1901-0838	5		DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A3E1	0340-0060	4	3	TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A3E2	0340-0060	4		TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A3E3	0340-0060	4		TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A3E4						
A3E5	0340-0140	1	2	INSULATOR-XSTR MICA	28480	0340-0140
A3E6						
A3E52	0360-1514	7	46	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A3E53	1251-0600	0	1	CONNECTOR-SGL CONT PIN 1.14-MW-B3C-SZ SQ	28480	1251-0600
A3E54	1400-0482	3	1	CABLE TIE .062-3-DIA .14-WD NYL	28480	1400-0482
A3E55	2110-0269	0	4	FUSEHOLDER-CLIP TYPE.250-FUSE	28480	2110-0269
A3E56	2110-0269	0		FUSEHOLDER-CLIP TYPE.250-FUSE	28480	2110-0269
A3E57	2110-0269	0		FUSEHOLDER-CLIP TYPE.250-FUSE	28480	2110-0269
A3E58	2110-0269	0		FUSEHOLDER-CLIP TYPE.250-FUSE	28480	2110-0269
A3E59	7100-1163	9	1	CAN-ROUND	28480	7100-1163
A3E60	07040-20530	1	4	WASHER-SHOULDERED	28480	07040-20530
A3E61	07040-20530	1		WASHER-SHOULDERED	28480	07040-20530
A3E62	07040-20530	1		WASHER-SHOULDERED	28480	07040-20530
A3E63	07040-20530	1		WASHER-SHOULDERED	28480	07040-20530
A3E64	07041-00010	1	1	HEAT SINK	28480	07041-00010
A3F1	2110-0043	8	2	FUSE 1.5A 250V NTD 1.25X.25 UL	28480	2110-0043
A3F2	2110-0043	8		FUSE 1.5A 250V NTD 1.25X.25 UL	28480	2110-0043
A3H1						
A3H6	0590-0199	9	6	NUT-HEX-W/LKWR 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
A3H7	2190-0182	4	2	WASHER-FL NW NO. 3 .11-IN-ID .25-IN-OD	28480	2190-0182
A3H8	2190-0182	4		WASHER-FL NW NO. 3 .11-IN-ID .25-IN-OD	28480	2190-0182
A3H9	2200-0141	8	2	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A3H10	2200-0141	8		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A3H11	2200-0523	0	4	SCREW-MACH 4-40 .562-IN-LG PAN-HD-PHL	00000	ORDER BY DESCRIPTION
A3H12	2200-0523	0		SCREW-MACH 4-40 .562-IN-LG PAN-HD-PHL	00000	ORDER BY DESCRIPTION
A3H13	2200-0523	0		SCREW-MACH 4-40 .562-IN-LG PAN-HD-PHL	00000	ORDER BY DESCRIPTION
A3H14	2200-0523	0		SCREW-MACH 4-40 .562-IN-LG PAN-HD-PHL	00000	ORDER BY DESCRIPTION
A3Q1	1854-0376	5	1		28480	1854-0376
A3Q2	1854-0071	7	2	TRANSISTOR NPN 8I PD=300MA FT=200MHZ	28480	1854-0071
A3Q3	1854-0071	7		TRANSISTOR NPN 8I PD=300MA FT=200MHZ	28480	1854-0071
A3Q4	1854-0039	7	2	TRANSISTOR NPN 2N30538 SI TO-39 PD=1W	01928	2N30538
A3Q5	1953-0012	4	1	TRANSISTOR PNP 2N2904A SI TO-39 PD=600MA	01295	2N2904A
A3Q6	1854-0072	8	1	TRANSISTOR NPN 2N3054 SI TO-66 PD=25A	01928	2N3054
A3Q7	1853-0303	6	1	TRANSISTOR PNP 2N5956 SI TO-66 PD=40A	04713	2N5956
A3Q8	1854-0039	7		TRANSISTOR NPN 2N30538 SI TO-39 PD=1W	01928	2N30538
A3Q9	1854-0041	1	1	TRANSISTOR 2N2708 SI PD=200MA FT=2GHZ	28480	1854-0041
A3Q10	1854-0215	1	1	TRANSISTOR NPN 8I PD=350MA FT=300MHZ	04713	2N3904

Table 7-3. X-Axis Amplifier PCA A3 Parts List (Sheet 2 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3Q11	1853-0036	2	1	TRANSISTOR PNP SI PD=310MHZ FT=250MHZ	28480	1853-0036
A3R1	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-1001-F
A3R2	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-3481-F
A3R3	0698-6977	1	2	RESISTOR 30K .1% .125W F TC=0+/-25	28480	0698-6977
A3R4	0698-6977	1	1	RESISTOR 30K .1% .125W F TC=0+/-25	28480	0698-6977
A3R5	0757-0398	4	1	RESISTOR 75 1% .125W F TC=0+/-100	24546	C4=1/8-T0-75R0-F
A3R6	2100-3288	8	1	RESISTOR-TRMR 50 20% C TOP-ADJ 17-TRN	28480	2100-3288
A3R7	0757-0444	1	1	RESISTOR 12.1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-1212-F
A3R8	0757-0278	9	1	RESISTOR 1.78K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-1781-F
A3R9	0698-8747	7	1	RESISTOR 833.3 .1% .125W F TC=0+/-25	28480	0698-8747
A3R10	0698-8757	9	1	RESISTOR 51 5% .125W CF TC=0-300	28480	0698-8757
A3R11	0757-0442	9	3	RESISTOR 10K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-1002-F
A3R12	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-1002-F
A3R13	0698-5846	1	2	RESISTOR 13M 5% .5W CC TC=0+1059	01121	EB1365
A3R14	0698-5846	1	1	RESISTOR 13M 5% .5W CC TC=0+1059	01121	EB1365
A3R15	0603-1065	7	1	RESISTOR 10M 5% .25W CC TC=+900/+1100	01121	CB1065
A3R16	2100-2030	6	1	RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	73138	82PR20K
A3R17	0698-6619	8	2	RESISTOR 15K .1% .125W F TC=0+/-25	28480	0698-6619
A3R18	0698-6619	8	1	RESISTOR 15K .1% .125W F TC=0+/-25	28480	0698-6619
A3R19	0757-0440	7	2	RESISTOR 7.5K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-7501-F
A3R20	0757-0442	9	1	RESISTOR 10K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-1002-F
A3R21	0698-7494	9	1	RESISTOR 34.8K 1% .125W F TC=0+/-25	19701	MF4C1/8-T9-3482-F
A3R22	0698-7322	2	1	RESISTOR 4.25K .25% .125W F TC=0+/-25 (ENGLISH)	19701	MF4C1/8-T9-4251-C
A3R22	0698-5556	0	1	RESISTOR 3.3K 1% .125W F TC=0+/-25 (METRIC)	28480	0698-5556
A3R23	2100-3296	8	1	RESISTOR-TRMR 1K 10% C TOP-ADJ 17-TRN	28480	2100-3296
A3R24	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-1001-F
A3R25	0757-0279	0	3	RESISTOR 3.16K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-3161-F
A3R26	0698-7646	3	1	RESISTOR 31.6K 1% .125W F TC=0+/-25	19701	MF4C1/8-T9-3162-F
A3R27	0757-0283	6	2	RESISTOR 2K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-2001-F
A3R28	0698-3437	2	2	RESISTOR 133 1% .125W F TC=0+/-100	24546	C4=1/8-T0-133R-F
A3R29	0698-3437	2	2	RESISTOR 133 1% .125W F TC=0+/-100	24546	C4=1/8-T0-133R-F
A3R30	0757-0440	7	1	RESISTOR 7.5K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-7501-F
A3R31	0757-0346	2	3	RESISTOR 10 1% .125W F TC=0+/-100	24546	C4=1/8-T0-10R0-F
A3R32	0757-0346	2	2	RESISTOR 10 1% .125W F TC=0+/-100	24546	C4=1/8-T0-10R0-F
A3R33	0757-0346	2	1	RESISTOR 10 1% .125W F TC=0+/-100	24546	C4=1/8-T0-10R0-F
A3R34	0757-0401	0	3	RESISTOR 100 1% .125W F TC=0+/-100	24546	C4=1/8-T0-101-F
A3R35	0757-0137	9	1	RESISTOR 750K 1% .5W F TC=0+/-100	28480	0757-0137
A3R36	0757-0283	6	1	RESISTOR 2K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-2001-F
A3R37	2100-2497	9	1	RESISTOR-TRMR 2K 10% C TOP-ADJ 1-TRN	73138	82PR2K
A3R38	0757-0394	0	1	RESISTOR 51.1 1% .125W F TC=0+/-100	24546	C4=1/8-T0-51R1-F
A3R39	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-1001-F
A3R40	0698-3260	9	1	RESISTOR 464K 1% .125W F TC=0+/-100	28480	0698-3260
A3R41	0757-0279	0	1	RESISTOR 3.16K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-3161-F
A3R42	0757-0279	0	1	RESISTOR 3.16K 1% .125W F TC=0+/-100	24546	C4=1/8-T0-3161-F
A3R43	0757-0420	3	2	RESISTOR 750 1% .125W F TC=0+/-100	24546	C4=1/8-T0-751-F
A3R44	0757-0420	3	1	RESISTOR 750 1% .125W F TC=0+/-100	24546	C4=1/8-T0-751-F
A3R45	0757-0401	0	1	RESISTOR 100 1% .125W F TC=0+/-100	24546	C4=1/8-T0-101-F
A3R46	0757-0401	0	1	RESISTOR 100 1% .125W F TC=0+/-100	24546	C4=1/8-T0-101-F
A3U1	1826-0059	2	4	IC OP AMP GP T0-99 PKG	01295	LM201AL
A3U2	1826-0059	2	4	IC OP AMP GP T0-99 PKG	01295	LM201AL
A3U3	1826-0059	2	4	IC OP AMP GP T0-99 PKG	01295	LM201AL
A3U4	1826-0059	2	4	IC OP AMP GP T0-99 PKG	01295	LM201AL
A3VR1	1902-0025	4	2	DIODE-ZNR 10V 5% 00-35 PD=.4W TC=+.06% DIODE-ZNR 10V 5% 00-35 PD=.4W TC=+.06%	28480	1902-0025
A3VR2	1902-0025	4	2	DIODE-ZNR 10V 5% 00-35 PD=.4W TC=+.06% DIODE-ZNR 10V 5% 00-35 PD=.4W TC=+.06%	28480	1902-0025
A3VR3	1902-0041	4	1	DIODE-ZNR 5.11V 5% 00-35 PD=.4W	28480	1902-0041
A3VR4	1902-3172	8	2	DIODE-ZNR 11V 2% 00-35 PD=.4W TC=+.062% DIODE-ZNR 11V 2% 00-35 PD=.4W TC=+.062%	28480	1902-3172
A3VR5	1902-3172	8	2	DIODE-ZNR 11V 2% 00-35 PD=.4W TC=+.062% DIODE-ZNR 11V 2% 00-35 PD=.4W TC=+.062%	28480	1902-3172
A3VR6	1902-3214	9	2	DIODE-ZNR 16.2V 2% 00-35 PD=.4W	28480	1902-3214
A3VR7	1902-3214	9	2	DIODE-ZNR 16.2V 2% 00-35 PD=.4W	28480	1902-3214
A3VR8	1902-0786	4	2	DIODE-ZNR 1N937 9V 5% 00-7 PD=.5W	24046	1N937
A3VR9	1902-0786	4	2	DIODE-ZNR 1N937 9V 5% 00-7 PD=.5W	24046	1N937
A3W1	8151-0013	4	1	WIRE 22AWG 1X22	28480	8151-0013
A3W2	8151-0355	7	1	WIRE 22AWG	28480	8151-0355



7044-A-51-1

NOTE: HEAT SINKS REMOVED FOR CLARITY.

Figure 7-5. X-Axis Amplifier Circuit Board – 7044B

A3 - X AXIS AMP. PCA
(07044-60100 (ENG.))
(07044-60590 (MET.))

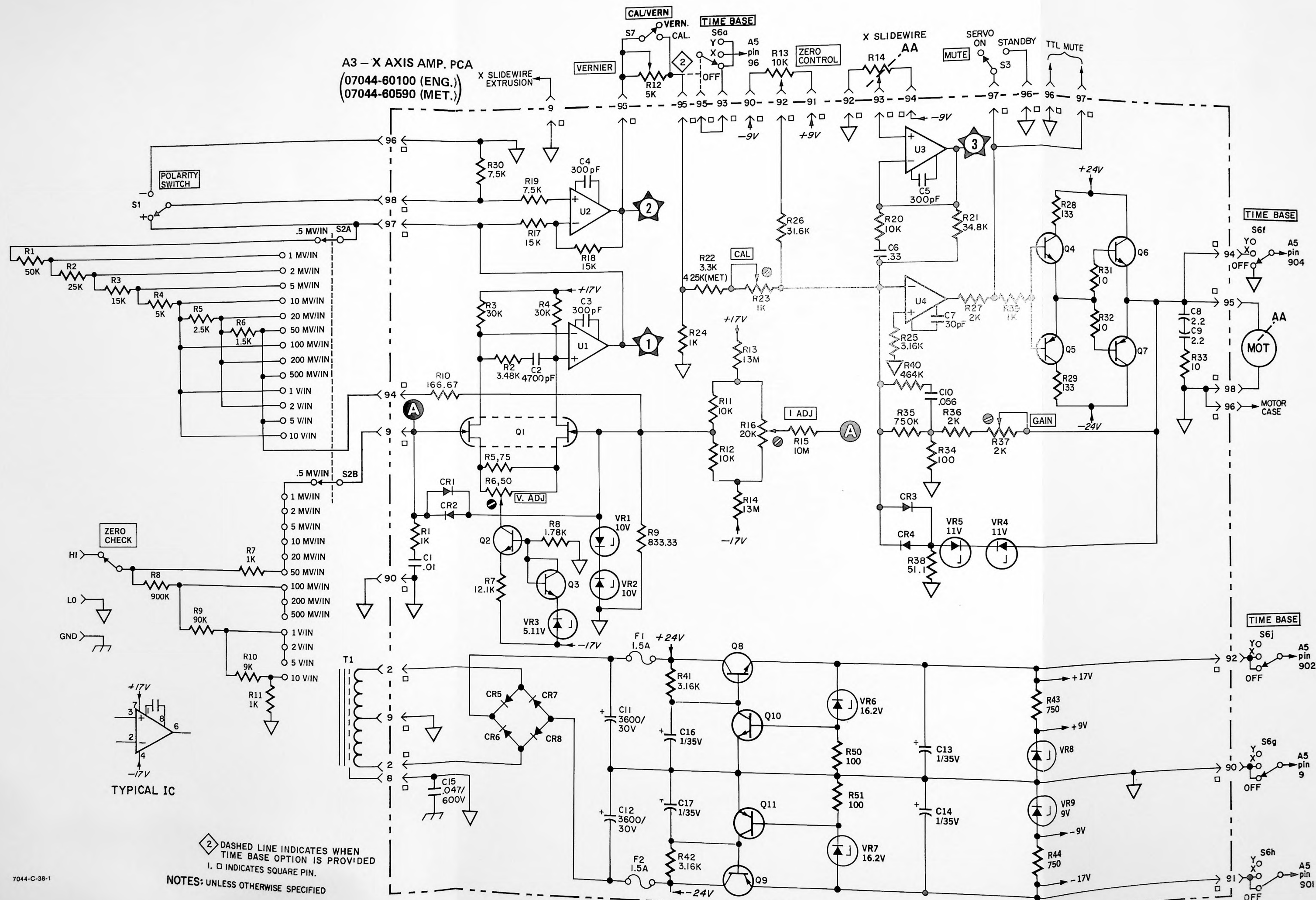


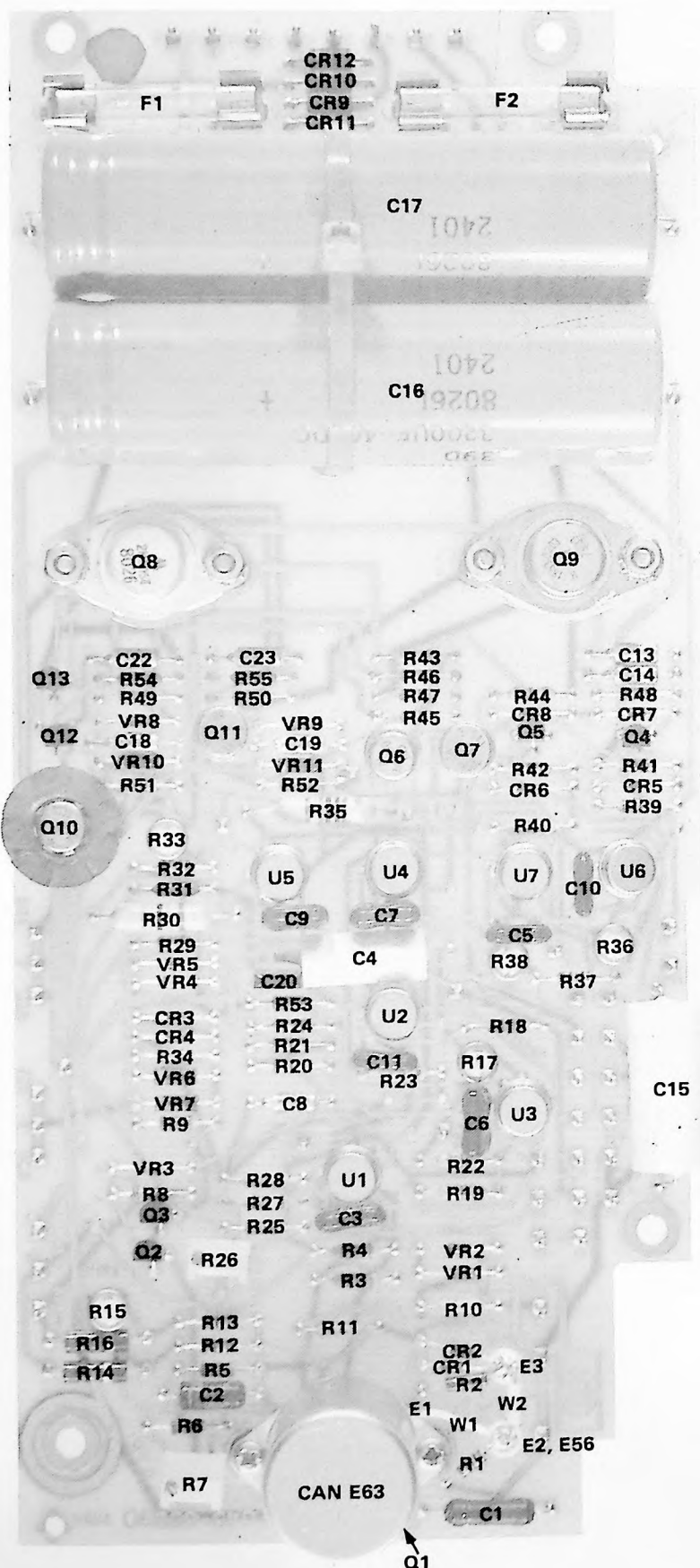
Figure 7-6. X-Axis DC Amplifier Schematic
Model 7044B

Table 7-4. Y-Axis Amplifier PCA A2 Parts List — 7045B (Sheet 1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2	07045-60090	7	1	PCA, Y-AXIS AMPLIFIER (ENGLISH)	28480	07045-60090
A2	07045-60110	2		PCA, Y-AXIS AMPLIFIER (METRIC)	28480	07045-60110
A2C1	0160-0161	4	1	CAPACITOR-FXD .01UF +-10% 200VDC POLYE	28480	0160-0161
A2C2	0160-0157	8	1	CAPACITOR-FXD 4700PF +-10% 200VDC POLYE	28480	0160-0157
A2C3	0160-2207	3	3	CAPACITOR-FXD 300PF +-5% 300VDC MICA	28480	0160-2207
A2C4	0160-2406	4	1	CAPACITOR-FXD .27UF +-10% 80VDC POLYE	28480	0160-2406
A2C5	0160-2199	2	4	CAPACITOR-FXD 30PF +-5% 300VDC MICA	28480	0160-2199
A2C6	0160-2207	3		CAPACITOR-FXD 300PF +-5% 300VDC MICA	28480	0160-2207
A2C7	0160-2207	3		CAPACITOR-FXD 300PF +-5% 300VDC MICA	28480	0160-2207
A2C8	0160-0291	3	5	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A2C9	0160-2199	2		CAPACITOR-FXD 30PF +-5% 300VDC MICA	28480	0160-2199
A2C10	0160-2199	2		CAPACITOR-FXD 30PF +-5% 300VDC MICA	28480	0160-2199
A2C11	0160-2199	2		CAPACITOR-FXD 30PF +-5% 300VDC MICA	28480	0160-2199
A2C12				NOT ASSIGNED		
A2C13	0160-0197	8	2	CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A2C14	0160-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A2C15	0160-0819	9	1	CAPACITOR-FXD .047UF +-10% 600VDC POLYE	09023	MMF-6847
A2C16	0160-2496	4	2	CAPACITOR-FXD 3200UF+75-10% 40VDC AL	56289	390328G040JT6-D80
A2C17	0160-2496	4		CAPACITOR-FXD 3200UF+75-10% 40VDC AL	56289	390328G040JT6-D80
A2C18	0160-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A2C19	0160-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A2C20				NOT ASSIGNED		
A2C21				NOT ASSIGNED		
A2C22	0160-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A2C23	0160-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A2CR1	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A2CR2	1901-0376	6		DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A2CR3	1901-0044	5	2	DIODE-SWITCHING 50V 50MA 6NS	28480	1901-0044
A2CR4	1901-0044	5		DIODE-SWITCHING 50V 50MA 6NS	28480	1901-0044
A2CR5	1901-0025	2	4	DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A2CR6	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A2CR7	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A2CR8	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A2CR9	1901-0838	5	4	DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A2CR10	1901-0838	5		DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A2CR11	1901-0838	5		DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A2CR12	1901-0838	5		DIODE-PWR RECT 1N5393 200V 1.5A	01928	1N5393
A2E1	0340-0060	4	3	TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A2E2	0340-0060	4		TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A2E3	0340-0060	4		TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A2E4	0340-0140	1	2	INSULATOR-XSTR MICA	28480	0340-0140
A2E5	0340-0140	1		INSULATOR-XSTR MICA	28480	0340-0140
A2E6	0340-0164	9	2	INSULATOR-XSTR NYLON	28480	0340-0164
A2E7	0340-0164	9		INSULATOR-XSTR NYLON	28480	0340-0164
A2E8						
A2E53	0360-1514	7	45	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A2E54	1205-0011	0	2	HEAT SINK TO-5/TO-39-CS	28480	1205-0011
A2E55	1205-0011	0		HEAT SINK TO-5/TO-39-CS	28480	1205-0011
A2E56	1251-0600	0	1	CONNECTOR-SGL CONT PIN 1,14-MM-BSC-SZ SQ	28480	1251-0600
A2E57	1400-0482	3	1	CABLE TIE .062-3-DIA .14-MD NYL	28480	1400-0482
A2E58				NOT ASSIGNED		
A2E59	2110-0269	0	4	FUSEHOLDER-CLIP TYPE,250-FUSE	28480	2110-0269
A2E60	2110-0269	0		FUSEHOLDER-CLIP TYPE,250-FUSE	28480	2110-0269
A2E61	2110-0269	0		FUSEHOLDER-CLIP TYPE,250-FUSE	28480	2110-0269
A2E62	2110-0269	0		FUSEHOLDER-CLIP TYPE,250-FUSE	28480	2110-0269
A2E63	7100-1163	9	1	CAN-RND .906-IN-ODP-OUT .938-IN-ND-OUT	28480	7100-1163
A2E64	07040-20530	1	4	WASHER-SHOULDERED	28480	07040-20530
A2E65	07040-20530	1		WASHER-SHOULDERED	28480	07040-20530
A2E66	07040-20530	1		WASHER-SHOULDERED	28480	07040-20530
A2E67	07040-20530	1		WASHER-SHOULDERED	28480	07040-20530
A2E68	07041-00010	1	1	HEAT SINK	28480	07041-00010
A2F1	2110-0043	8	2	FUSE 1.5A 250V NTD 1,25X,25 UL	28480	2110-0043
A2F2	2110-0043	8		FUSE 1.5A 250V NTD 1,25X,25 UL	28480	2110-0043
A2H1-						
A2H6	0590-0199	9	6	NUT-MEX-H/LKX 4-40-THD .094-I/H-THK	00000	ORDER BY DESCRIPTION
A2H7	2190-0182	4	2	WASHER-FL NM NO. 3 .11-I/H-ID .25-I/H-OD	28480	2190-0182
A2H8	2190-0182	4		WASHER-FL NM NO. 3 .11-I/H-ID .25-I/H-OD	28480	2190-0182
A2H9	2200-0141	8	2	SCREW-MACH 4-40 .312-I/H-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A2H10	2200-0141	8		SCREW-MACH 4-40 .312-I/H-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A2H11-						
A2H14	2200-0523	0	4	SCREW-MACH 4-40 .562-IN-LG PAN-HD-PHL	00000	ORDER BY DESCRIPTION

Table 7-4. Y-Axis Amplifier PCA A2 Parts List — 7045B (Sheet 2 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2Q1	1855-0376	7	1	TRANSISTOR-JFET DUAL N-CHAN D-MODE SI	28480	1855-0376
A2Q2	1854-0071	7	2	TRANSISTOR NPN SI PD=300MA FT=200MHZ	28480	1854-0071
A2Q3	1854-0071	7	1	TRANSISTOR NPN SI PD=300MA FT=200MHZ	28480	1854-0071
A2Q4	1853-0036	2	2	TRANSISTOR PNP SI PD=310MA FT=250MHZ	28480	1853-0036
A2Q5	1854-0087	5	1	TRANSISTOR NPN SI PD=360MA FT=75MHZ	28480	1854-0087
A2Q6	1854-0090	0	1	TRANSISTOR NPN SI TO-39 PD=1A FT=100MHZ	28480	1854-0090
A2Q7	1853-0041	9	2	TRANSISTOR PNP SI TO-39 PD=1A FT=60MHZ	28480	1853-0041
A2Q8	1854-0072	8	1	TRANSISTOR NPN 2N3054 SI TO-66 PD=25A	01928	2N3054
A2Q9	1853-0303	6	1	TRANSISTOR PNP 2N5956 SI TO-66 PD=40A	04713	2N5956
A2Q10	1854-0039	7	1	TRANSISTOR NPN 2N3053 SI TO-39 PD=1A	01928	2N3053
A2Q11	1853-0041	9	1	TRANSISTOR PNP SI TO-39 PD=1A FT=60MHZ	28480	1853-0041
A2Q12	1854-0215	1	1	TRANSISTOR NPN SI PD=350MA FT=300MHZ	04713	2N3904
A2Q13	1853-0036	2	1	TRANSISTOR PNP SI PD=310MA FT=250MHZ	28480	1853-0036
A2R1	0757-0280	3	4	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1001-F
A2R2	0683-1065	7	1	RESISTOR 10M 5% .25A CC TC=900/+1100	01121	C81065
A2R3	0698-6977	1	2	RESISTOR 30K 1% .125W F TC=0+-25	28480	0698-6977
A2R4	0698-6977	1	1	RESISTOR 30K 1% .125W F TC=0+-25	28480	0698-6977
A2R5	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0=3481-F
A2R6	0757-0398	4	1	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0=75R0-F
A2R7	2100-3288	8	1	RESISTOR-TRMR 50 20% C TOP-ADJ 17-TRN	28480	2100-3288
A2R8	0757-0444	1	2	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1212-F
A2R9	0757-0278	9	1	RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1781-F
A2R10	0698-8756	8	1	RESISTOR 166.7 1% .125W F TC=0+-25	28480	0698-8756
A2R11	0698-8747	7	1	RESISTOR 833.3 1% .125W F TC=0+-25	28480	0698-8747
A2R12	0757-0442	9	5	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1002-F
A2R13	0757-0442	9	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1002-F
A2R14	0698-5846	1	2	RESISTOR 13M 5% .5W CC TC=0+1059	01121	EB1365
A2R15	2100-2030	6	1	RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	73138	82PR20K
A2R16	0698-5846	1	1	RESISTOR 13M 5% .5W CC TC=0+1059	01121	EB1365
A2R17	2100-2031	7	1	RESISTOR-TRMR 50K 10% C TOP-ADJ 1-TRN	73138	82PR50K
A2R18	0698-3101	7	1	RESISTOR 2.87K 1% .5W F TC=0+-100	28480	0698-3101
A2R19	0698-6619	8	2	RESISTOR 15K 1% .125W F TC=0+-25	28480	0698-6619
A2R20	0757-0440	7	2	RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0=7501-F
A2R21	0757-0440	7	1	RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0=7501-F
A2R22	0698-6619	8	1	RESISTOR 15K 1% .125W F TC=0+-25	28480	0698-6619
A2R23	0698-7494	9	1	RESISTOR 34.8K 1% .125W F TC=0+-25	19701	MF4C1/8-T9=3482-F
A2R24	0757-0290	5	1	RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0=6191-F
A2R25	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1001-F
A2R26	2100-3296	8	1	RESISTOR-TRMR 1K 10% C TOP-ADJ 17-TRN	28480	2100-3296
A2R27	0698-5556	0	1	RESISTOR 3.3K 1% .125W F TC=0+-25 (ENGLISH)	28480	0698-5556
A2R27	0698-7322	0	1	RESISTOR 4.25K 1% .125W F TC=0+-100 (METRIC)	28480	0698-7322
A2R28	0698-7646	3	1	RESISTOR 31.6K 1% .125W F TC=0+-25	19701	MF4C1/8-T9=3162-F
A2R29	0757-0279	0	3	RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0=3161-F
A2R30	0757-0137	9	1	RESISTOR 750K 1% .5W F TC=0+-100	28480	0757-0137
A2R31	0757-0403	2	1	RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0=121R-F
A2R32	0698-3150	6	1	RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0=2371-F
A2R33	2100-1788	9	3	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	73138	82PR500
A2R34	0757-0394	0	1	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0=51R1-F
A2R35	0757-0159	5	1	RESISTOR 1K 1% .5W F TC=0+-100	28480	0757-0159
A2R36	2100-1788	9	1	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	73138	82PR500
A2R37	0757-0444	1	1	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1212-F
A2R38	2100-1788	9	1	RESISTOR-TRMR 500 10% C TOP-ADJ 1-TRN	73138	82PR500
A2R39	0757-0439	4	2	RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0=6811-F
A2R40	0757-0439	4	1	RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0=6811-F
A2R41	0757-0442	9	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1002-F
A2R42	0757-0442	9	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1002-F
A2R43	0698-3437	2	2	RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0=133R-F
A2R44	0698-3437	2	1	RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0=133R-F
A2R45	0757-0442	9	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1002-F
A2R46	0757-0346	2	3	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0=10R0-F
A2R47	0757-0346	2	1	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0=10R0-F
A2R48	0757-0346	2	1	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0=10R0-F
A2R49	0757-0279	0	1	RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0=3161-F
A2R50	0757-0279	0	1	RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0=3161-F
A2R51	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1001-F
A2R52	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0=1001-F
A2R53	0698-3266	5	1	RESISTOR 237K 1% .125W F TC=0+-100	24546	C4-1/8-T0=2373-F
A2R54	0757-0401	0	2	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0=101-F
A2R55	0757-0401	0	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0=101-F
A2U1	1826-0059	2	6	IC OP AMP GP TO-99 PKG	01295	LM201AL
A2U2	1826-0059	2	1	IC OP AMP GP TO-99 PKG	01295	LM201AL
A2U4	1826-0059	2	1	IC OP AMP GP TO-99 PKG	01295	LM201AL
A2U5	1826-0059	2	1	IC OP AMP GP TO-99 PKG	01295	LM201AL
A2U6	1826-0059	2	1	IC OP AMP GP TO-99 PKG	01295	LM201AL
A2U7	1826-0059	2	1	IC OP AMP GP TO-99 PKG	01295	LM201AL
A2VR1	1902-0025	4	2	DIODE-ZNR 10V 5%	28480	1902-0025
A2VR2	1902-0025	4	1	DIODE-ZNR 10V 5%	28480	1902-0025
A2VR3	1902-0041	4	1	DIODE-ZNR 5.11V 5%	28480	1902-0041
A2VR4	1902-3172	8	2	DIODE-ZNR 11V 2%	28480	1902-3172
A2VR5	1902-3172	8	1	DIODE-ZNR 11V 2%	28480	1902-3172
A2VR6	1902-3094	3	2	DIODE-ZNR 5.11V 2%	28480	1902-3094
A2VR7	1902-3094	3	1	DIODE-ZNR 5.11V 2%	28480	1902-3094
A2VR8	1902-3214	9	2	DIODE-ZNR 16.2V 2%	28480	1902-3214
A2VR9	1902-3214	9	1	DIODE-ZNR 16.2V 2%	28480	1902-3214
A2VR10	1902-0777	3	2	DIODE-ZNR 6.2V 5%	28480	1902-0777
A2VR11	1902-0777	3	1	DIODE-ZNR 6.2V 5%	28480	1902-0777
A2W1	8150-0355	5	1	WIRE 22AWG Y 42V TFE 19X34 105C	28480	8150-0355
A2W2	8151-0013	4	1	WIRE 22AWG 1X22	28480	8151-0013



NOTE: HEAT SINKS REMOVED FOR CLARITY.

Figure 7-7. Y-Axis DC Amplifier Circuit Board – 7045B

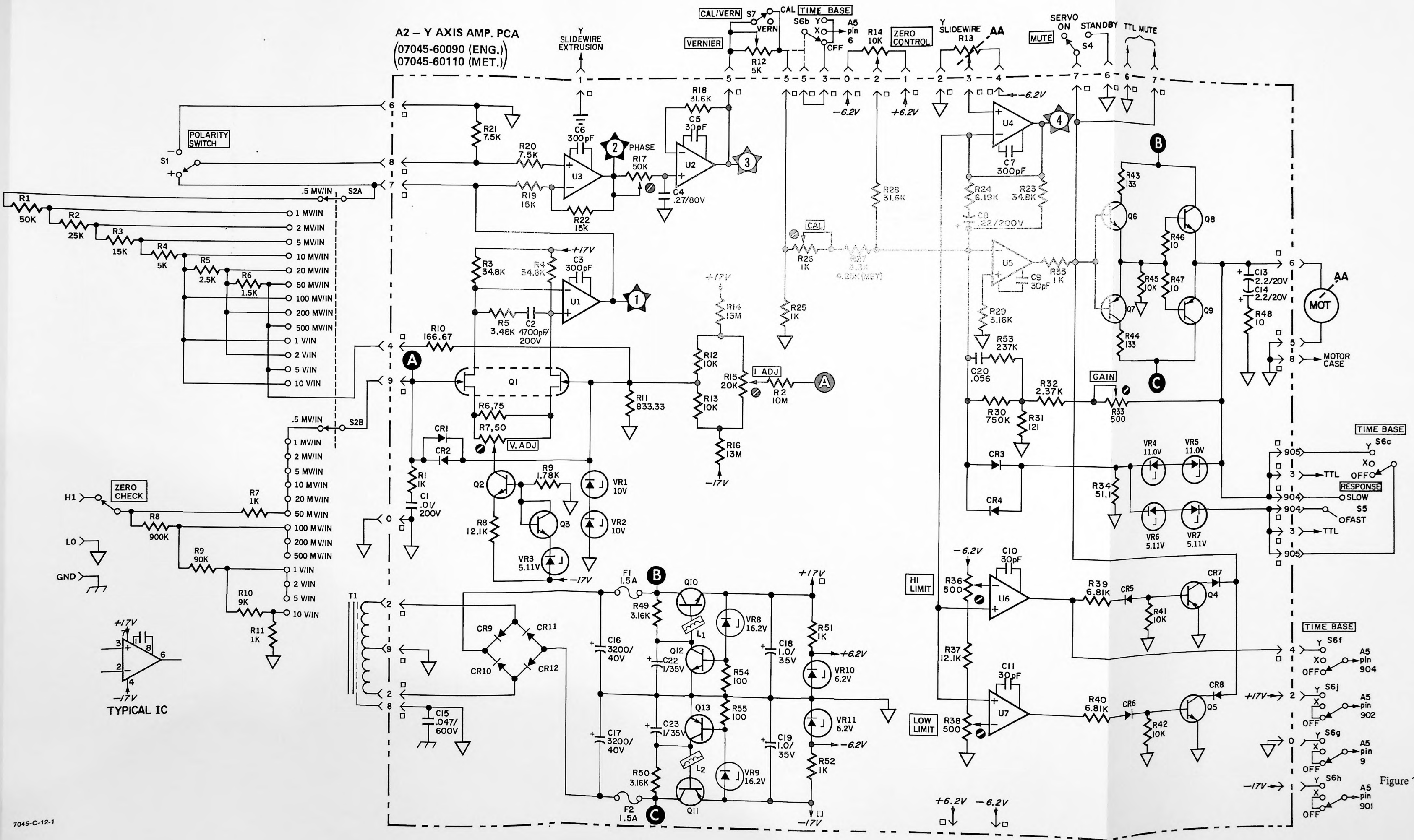


Figure 7-8. Y-Axis DC Amp

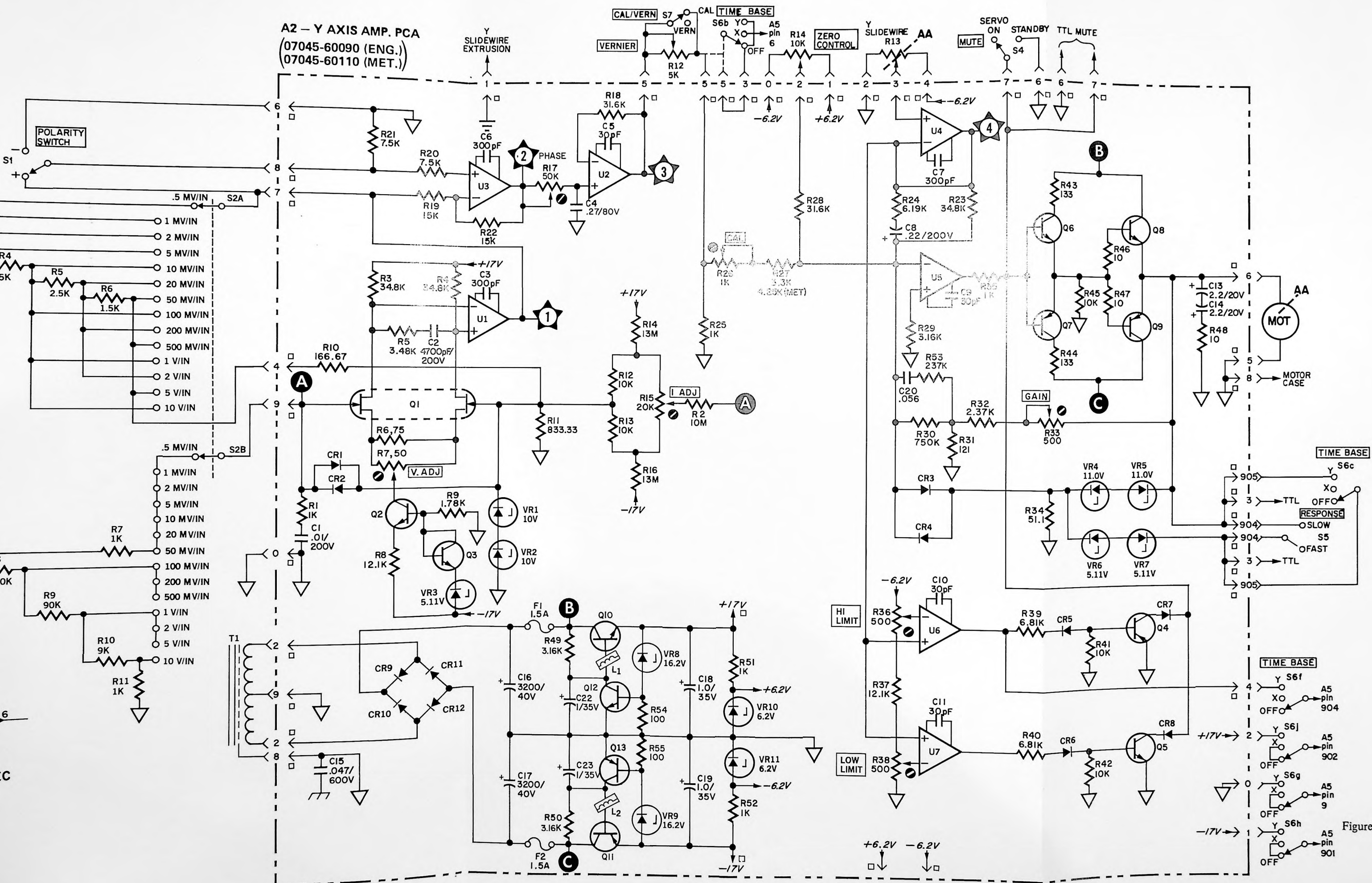


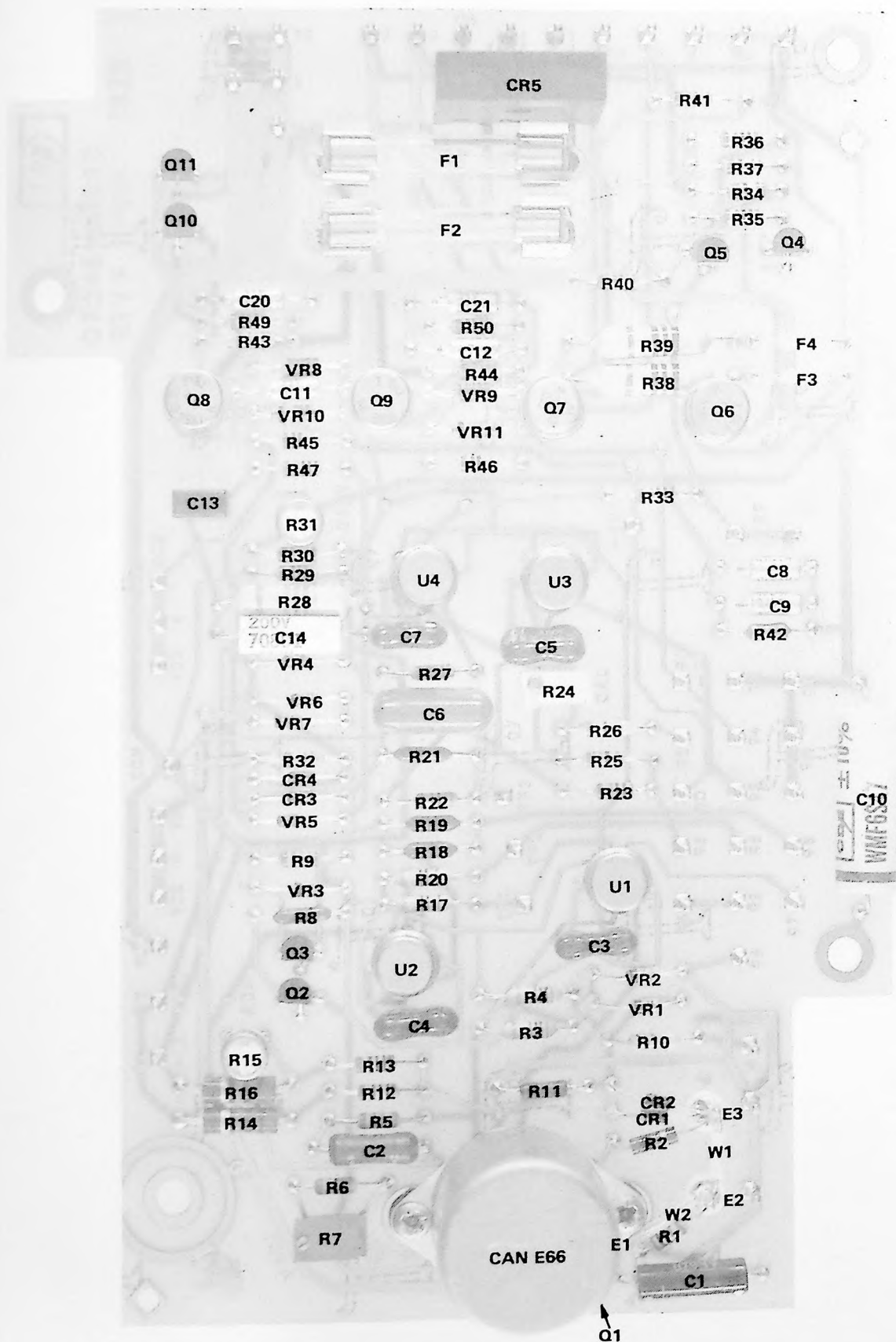
Figure 7-8. Y-Axis DC Amplifier Schematic Model 7045B

Table 7-5. X-Axis Amplifier PCA A3 Parts List - 7045B (Sheet 1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3	07045-60080	5	1	PCA-X-AXIS AMPLIFIER (ENGLISH)	28480	07045-60080
A3	07045-60100	0		PCA-X-AXIS AMPLIFIER (METRIC)	28480	07045-60100
A3C1	0160-0161	4	1	CAPACITOR-FXD .01UF +-10% 200VDC POLYE	28480	0160-0161
A3C2	0160-0157	4	1	CAPACITOR-FXD 4700PF +-10% 200VDC POLYE	28480	0160-0157
A3C3	0160-2207	3	3	CAPACITOR-FXD 300PF +-5% 300VDC MICA	28480	0160-2207
A3C4	0160-2207	3		CAPACITOR-FXD 300PF +-5% 300VDC MICA	28480	0160-2207
A3C5	0160-2207	3		CAPACITOR-FXD 300PF +-5% 300VDC MICA	28480	0160-2207
A3C6	0160-4264	6	1	CAPACITOR-FXD .39UF +-10% 100VDC	84411	HEW395
A3C7	0160-2199	2	1	CAPACITOR-FXD 30PF +-5% 300VDC MICA	28480	0160-2199
A3C8	0180-0197	8	2	CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A3C9	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A3C10	0160-0819	9	1	CAPACITOR-FXD .047UF +-10% 600VDC POLYE	09023	WVF-6347
A3C11	0180-0291	3	4	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A3C12	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A3C13	0160-4004	2	1	CAPACITOR-FXD .1UF +-20% 50VDC MET-POLYC	28480	0160-4004
A3C14	0160-0302	5	1	CAPACITOR-FXD .018UF +-10% 200VDC POLYE	28480	0160-0302
A3C15-						
A3C19				NOT ASSIGNED		
A3C20	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A3C21	0180-0291	3		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A3CR1	1901-0376	6	2	DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A3CR2	1901-0376	6		DIODE-GEN PRP 35V 50MA DO-35	28480	1901-0376
A3CR3	1901-0044	5	2	DIODE-SWITCHING 50V 50MA 6NS	28480	1901-0044
A3CR4	1901-0044	5		DIODE-SWITCHING 50V 50MA 6NS	28480	1901-0044
A3CR5	1901-0638	3	1	DIODE-FM BRDG 100V 4A	04713	MDA-970-2
A3E1-						
A3E3	0340-0060	4	3	TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011-6809 000 209
A3E4-						
A3E6	0340-0164	9	3	INSULATOR-XSTR NYLON	28480	0340-0164
A3E7				NOT ASSIGNED		
A3E8-						
A3E57	0360-1514	7	50	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A3E58-						
A3E61	1205-0011	0	4	HEAT SINK TO-5/TO-39-CS	28480	1205-0011
A3E62-						
A3E65	2110-0269	0	4	FUSEHOLDER-CLIP TYPE,250-FUSE	28480	2110-0269
A3E66	7100-1163	9	1	CAN-RND .906-IN-DP-OUT .938-IN-ND-OUT	28480	7100-1163
A3F1	2110-0055	2	2	FUSE 4A 250V NTO 1.25X.25 UL	75915	312004
A3F2	2110-0055	2		FUSE 4A 250V NTO 1.25X.25 UL	75915	312004
A3F3	2110-0343	1	2	FUSE .25A 125V NTO .281X.093	28480	2110-0343
A3F4	2110-0343	1		FUSE .25A 125V NTO .281X.093	28480	2110-0343
A3H1	0590-0199	9	2	NUT-HEX-H/LKAR 4-40-TND .094-IN-TMK	00000	ORDER BY DESCRIPTION
A3H2	0590-0199	9		NUT-HEX-H/LKAR 4-40-TND .094-IN-TMK	00000	ORDER BY DESCRIPTION
A3H3	2190-0182	4	2	WASHER-FL NM NO. 3 .11-IN-ID .25-IN-OD	28480	2190-0182
A3H4	2190-0182	4		WASHER-FL NM NO. 3 .11-IN-ID .25-IN-OD	28480	2190-0182
A3H5	2200-0141	8	2	SCREW-WACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A3H6	2200-0141	8		SCREW-WACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A3Q1	1855-0376	7	1	TRANSISTOR-JFET DUAL N-CHAN D-MODE SI	28480	1855-0376
A3Q2	1854-0071	7	2	TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854-0071
A3Q3	1854-0071	7		TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854-0071
A3Q4	1854-0087	5	1	TRANSISTOR NPN SI PD=360MHZ FT=75MHZ	28480	1854-0087
A3Q5	1853-0042	0	1	TRANSISTOR PNP SI PD=310MHZ FT=200MHZ	28480	1853-0042
A3Q6	1853-0041	9	2	TRANSISTOR PNP SI TO-39 PD=1A FT=60MHZ	28480	1853-0041
A3Q7	1854-0090	0	1	TRANSISTOR NPN SI TO-39 PD=1A FT=100MHZ	28480	1854-0090
A3Q8	1854-0039	7	1	TRANSISTOR NPN 2N3053S SI TO-39 PD=1A	01928	2N3053S
A3Q9	1853-0041	9		TRANSISTOR PNP SI TO-39 PD=1A FT=60MHZ	28480	1853-0041
A3Q10	1854-0215	1	1	TRANSISTOR NPN SI PD=350MHZ FT=300MHZ	04713	2N3904
A3Q11	1853-0036	2	1	TRANSISTOR PNP SI PD=310MHZ FT=250MHZ	28480	1853-0036
A3R1	0757-0280	3	5	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A3R2	0683-1065	7	1	RESISTOR 10W 5% .25W CC TC=-700/+1100	01121	C81065
A3R3	0698-6977	1	2	RESISTOR 30K .1% .125W F TC=0+-25	28480	0698-6977
A3R4	0698-6977	1		RESISTOR 30K .1% .125W F TC=0+-25	28480	0698-6977
A3R5	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A3R6	0757-0398	4	1	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A3R7	2100-3288	8	1	RESISTOR-TRMR 50 20% C TOP-ADJ 17-TRH	28480	2100-3288
A3R8	0757-0444	1	1	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A3R9	0757-0278	9	1	RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A3R10	0698-8756	8	1	RESISTOR 166.7 .1% .125W F TC=0+-25	28480	0698-8756

Table 7-5. X-Axis Amplifier PCA A3 Parts List — 7045B (Sheet 2 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3R11	0698-8747	7	1	RESISTOR 833.3 1% .125W F TC=0+-25	28480	0698-8747
A3R12	0757-0442	9	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4=1/8-T0=1002-F
A3R13	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4=1/8-T0=1002-F
A3R14	0698-5846	1	2	RESISTOR 13W 5% .5W CC TC=0+1059	01121	EB1365
A3R15	2100-2030	6	1	RESISTOR-TRMR 20K 10% C TOP=ADJ 1-TRN	73138	82PR20K
A3R16	0698-5846	1		RESISTOR 13W 5% .5W CC TC=0+1059	01121	EB1365
A3R17	0698-6619	8	2	RESISTOR 15K 1% .125W F TC=0+-25	28480	0698-6619
A3R18	0757-0440	7	2	RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4=1/8-T0=7501-F
A3R19	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4=1/8-T0=7501-F
A3R20	0698-6619	8		RESISTOR 15K 1% .125W F TC=0+-25	28480	0698-6619
A3R21	0698-7494	9	1	RESISTOR 34.8K 1% .125W F TC=0+-25	19701	MF4C1/8-T9=3482-F
A3R22	0757-0284	7	1	RESISTOR 150 1% .125W F TC=0+-100	24546	C4=1/8-T0=151-F
A3R23	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4=1/8-T0=1001-F
A3R24	2100-3296	8	1	RESISTOR-TRMR 1K 10% C TOP=ADJ 17-TRN	28480	2100-3296
A3R25	0698-5556	0	1	RESISTOR 3.3K 1% .125W F TC=0+-25	28480	0698-5556
A3R25	0698-7322	2	1	RESISTOR 4.25K .25% .125W F TC=0+-25 (ENGLISH) (METRIC)	19701	MF4C1/8-T9=4251-C
A3R26	0698-7646	3	1	RESISTOR 31.6K 1% .125W F TC=0+-25	19701	MF4C1/8-T9=3162-F
A3R27	0757-0279	0	3	RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4=1/8-T0=3161-F
A3R28	0757-0135	7	1	RESISTOR 511K 1% .5W F TC=0+-100	28480	0757-0135
A3R29	0757-0401	0	3	RESISTOR 100 1% .125W F TC=0+-100	24546	C4=1/8-T0=101-F
A3R30	0698-0084	9	1	RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4=1/8-T0=2151-F
A3R31	2100-2497	9	1	RESISTOR-TRMR 2K 10% C TOP=ADJ 1-TRN	73138	82PR2K
A3R32	0757-0394	0	1	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4=1/8-T0=51R1-F
A3R33	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4=1/8-T0=1001-F
A3R34	0757-0418	9	2	RESISTOR 619 1% .125W F TC=0+-100	24546	C4=1/8-T0=619R-F
A3R35	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4=1/8-T0=1001-F
A3R36	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4=1/8-T0=1001-F
A3R37	0757-0418	9		RESISTOR 619 1% .125W F TC=0+-100	24546	C4=1/8-T0=619R-F
A3R38	0757-0991	3	2	RESISTOR 20 1% .5W F TC=0+-100	28480	0757-0991
A3R39	0757-0991	3		RESISTOR 20 1% .5W F TC=0+-100	28480	0757-0991
A3R40	0757-0427	0	2	RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4=1/8-T0=1501-F
A3R41	0757-0427	0		RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4=1/8-T0=1501-F
A3R42	0683-0515	0	1	RESISTOR 5.1 5% .25W FC TC=400/+500	01121	CB51G5
A3R43	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4=1/8-T0=3161-F
A3R44	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4=1/8-T0=3161-F
A3R45	0757-0420	3	2	RESISTOR 750 1% .125W F TC=0+-100	24546	C4=1/8-T0=751-F
A3R46	0757-0420	3		RESISTOR 750 1% .125W F TC=0+-100	24546	C4=1/8-T0=751-F
A3R47	0757-0472	5	1	RESISTOR 200K 1% .125W F TC=0+-100	24546	C4=1/8-T0=2003-F
A3R48				NOT ASSIGNED		
A3R49	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4=1/8-T0=101-F
A3R50	0757-0401	0		RESISTOR 100 1% .125W F TC=0+-100	24546	C4=1/8-T0=101-F
A3U1	1826-0059	2	5	IC OP AMP GP T0-99 PKG	01295	LM201AL
A3U2	1826-0059	2		IC OP AMP GP T0-99 PKG	01295	LM201AL
A3U3	1826-0059	2		IC OP AMP GP T0-99 PKG	01295	LM201AL
A3U3	1826-0059	2		IC OP AMP GP T0-99 PKG	01295	LM201AL
A3U4	1826-0059	2		IC OP AMP GP T0-99 PKG	01295	LM201AL
A3VR1	1902-0025	4	2	DIODE-ZNR 10V 5% D0-35 PD=.4W TC=+.06%	28480	1902-0025
A3VR2	1902-0025	4		DIODE-ZNR 10V 5% D0-35 PD=.4W TC=+.06%	28480	1902-0025
A3VR3	1902-0041	4	1	DIODE-ZNR 5.11V 5% D0-35 PD=.4W	28480	1902-0041
A3VR4	1902-3191	1	2	DIODE-ZNR 13V 2% D0-35 PD=.4W TC=+.06%	28480	1902-3191
A3VR5	1902-3191	1		DIODE-ZNR 13V 2% D0-35 PD=.4W TC=+.06%	28480	1902-3191
A3VR6	1902-3110	4	2	DIODE-ZNR 5.9V 2% D0-35 PD=.4W TC=+.017%	28480	1902-3110
A3VR7	1902-3110	4		DIODE-ZNR 5.9V 2% D0-35 PD=.4W TC=+.017%	28480	1902-3110
A3VR8	1902-0202	9	2	DIODE-ZNR 15V 5% D0-15 PD=1W TC=+.057%	28480	1902-0202
A3VR9	1902-0202	9		DIODE-ZNR 15V 5% D0-15 PD=1W TC=+.057%	28480	1902-0202
A3VR10	1902-0786	4	2	DIODE-ZNR 1N937 9V 5% D0-7 PD=.5W	24046	1N937
A3VR11	1902-0786	4		DIODE-ZNR 1N937 9V 5% D0-7 PD=.5W	24046	1N937
A3W1	8150-0355	5	2	WIRE 22AWG Y 42V TFE 19X34 105C	28480	8150-0355
A3W2	8150-0355	5		WIRE 22AWG Y 42V TFE 19X34 105C	28480	8150-0355



7045-A-16-1

NOTE: HEAT SINKS REMOVED FOR CLARITY.

Figure 7-9. X-Axis DC Amplifier Circuit Board – 7045B

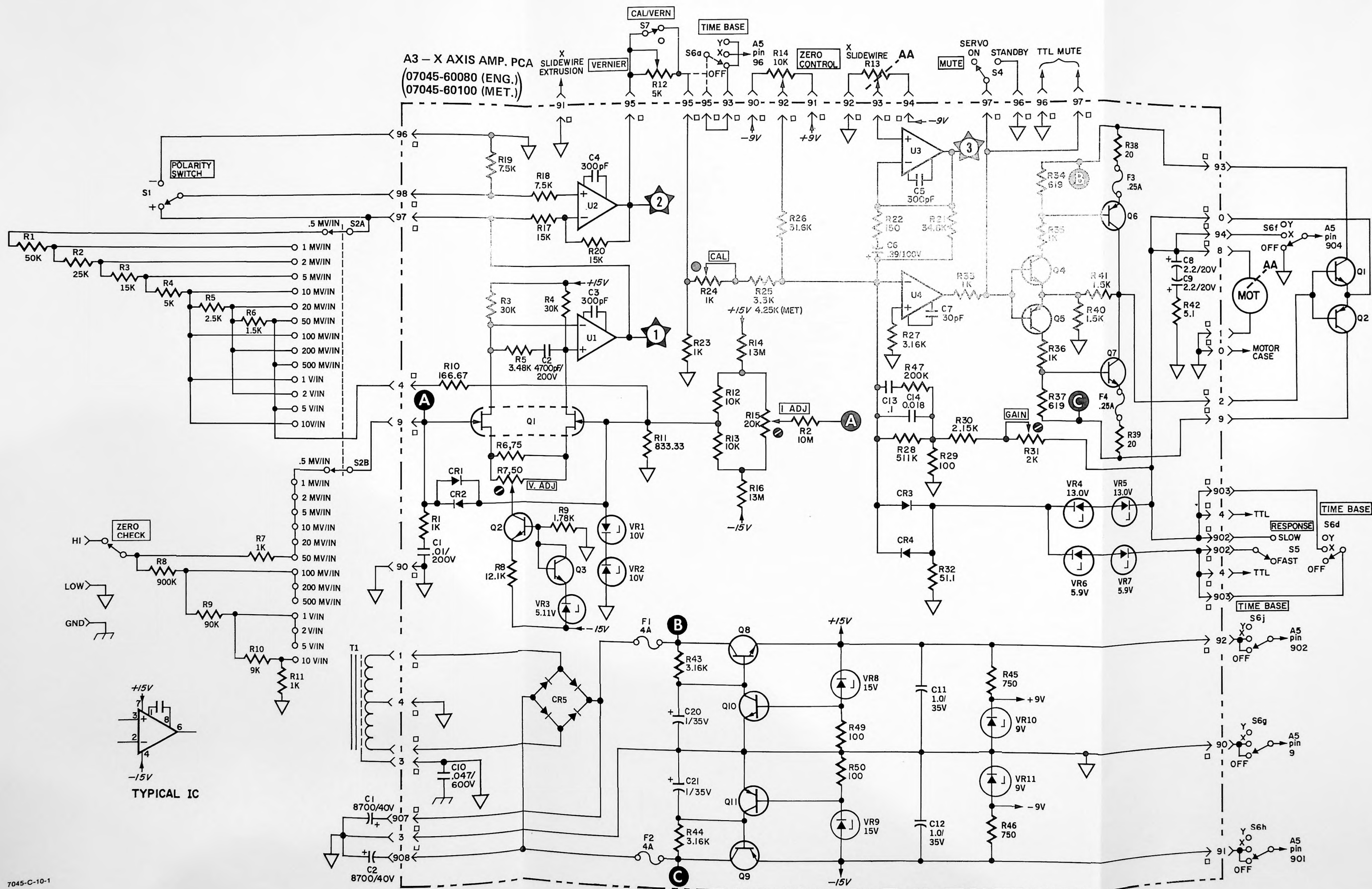


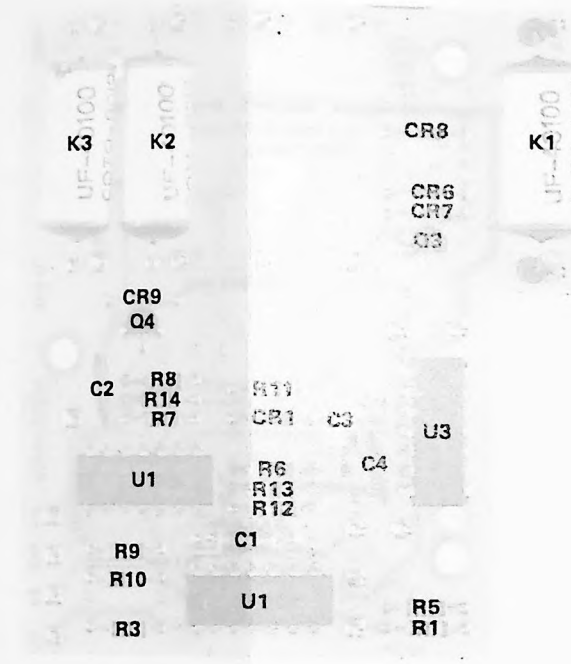
Table 7-6. TTL Control PCA A4 Parts List — 7044B

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A4	07044-60301	2	1	TTL BOARD ASSEMBLY	28480	07044-60301
A4C1	0180-0291	3	1	CAPACITOR-FXC 1UF+10% 35VDC TA	56289	150D105X9039A2
A4C2	0160-0820	2	2	CAPACITOR-FXC .05UF +80-20% 25VDC CER	28480	0160-0820
A4C3	0180-0309	4	1	CAPACITOR-FXC 4.7UF+20% 10VDC TA	56289	150D475X0010A2
A4C4	0160-0820	2		CAPACITOR-FXC .05UF +80-20% 25VDC CER	28480	0160-0820
A4CR1	1901-0025	2	5	DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A4CR2				NOT ASSIGNED		
A4CR5	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A4CR6	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A4CR7						
A4CR8	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A4CR9	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A4E1- A4E21	0360-1514	7	21	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A4K1	0490-1186	4	6	RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4K2	0490-1186	4		RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4K3	0490-1186	4		RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4L1	9170-0847	3	2	CORE-SHIELDING REAO	02114	56-590-65/3B PARYLENE COATED
A4L2	9170-0847	3		CORE-SHIELDING REAO	02114	56-590-65/3B PARYLENE COATED
A4Q1				NOT ASSIGNED		
A4Q2				NOT ASSIGNED		
A4Q3	1854-0071	7	2	TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854-0071
A4Q4	1854-0071	7		TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854-0071
A4R1	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R2				NOT ASSIGNED		
A4R3	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R4				NOT ASSIGNED		
A4R5	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R6	0698-4002	9	2	RESISTOR 5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5001-F
A4R7	0757-0442	9	5	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R8	0698-3150	6	1	RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A4R9	0698-4002	9		RESISTOR 5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5001-F
A4R10	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R11	0698-3160	8	1	RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A4R12	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R13	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R14	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4S3	0490-1186	4		RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4S4	0490-1186	4		RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4S5	0490-1186	4		RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4U1	1820-0269	4	2	IC GATE TTL NAND QUAD 2-INP	01295	8N7403N
A4U2	1820-0269	4		IC GATE TTL NAND QUAD 2-INP	01295	8N7403N
A4U3	1820-1270	9	1	IC MV TTL L M040STBL	01295	8N74L121N

Table 7-7. TTL Control PCA A4 Parts List — 7045B

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A4	07045-60115	7	1	PCA, TTL CONTROL	28480	07045-60115
A4C1	0180-0291	3	1	CAPACITOR-FXC 10F+-10% 35VDC TA	56289	1500105X9035A2
A4C2	0160-0820	2	2	CAPACITOR-FXC .05UF +80-20% 25VDC CER	28480	0160-0820
A4C3	0180-0309	4	1	CAPACITOR-FXC 4.7UF+-20% 10VDC TA	56289	1500475X0010A2
A4C4	0160-0820	2	2	CAPACITOR-FXC .05UF +80-20% 25VDC CER	28480	0160-0820
A4CR1	1901-0025	2	9	DIODE-GEN PRP 100V 200MA CO-7	28480	1901-0025
A4CR2	1901-0025	2	2	DIODE-GEN PRP 100V 200MA CO-7	28480	1901-0025
A4CR3	1901-0025	2	2	DIODE-GEN PRP 100V 200MA CO-7	28480	1901-0025
A4CR4	1901-0025	2	2	DIODE-GEN PRP 100V 200MA CO-7	28480	1901-0025
A4CR5	1901-0025	2	2	DIODE-GEN PRP 100V 200MA CO-7	28480	1901-0025
A4CR6	1901-0025	2	2	DIODE-GEN PRP 100V 200MA CO-7	28480	1901-0025
A4CR7	1901-0025	2	2	DIODE-GEN PRP 100V 200MA CO-7	28480	1901-0025
A4CR8	1901-0025	2	2	DIODE-GEN PRP 100V 200MA CO-7	28480	1901-0025
A4CR9	1901-0025	2	2	DIODE-GEN PRP 100V 200MA CO-7	28480	1901-0025
A4E1- A4E21	0360-1514	7	21	TERMINAL-STUD 9GL-PIN PRESS-MTG	28480	0360-1514
A4L1	9170-0847	3	2	CORE-SHIELDING BEAD	02114	56-590-65/3B PARYLENE COATED
A4L2	9170-0847	3	3	CORE-SHIELDING BEAD	02114	56-590-65/3B PARYLENE COATED
A4Q1	1854-0071	7	4	TRANSISTOR NPN SI PD=300MA FT=200MHZ	28480	1854-0071
A4Q2	1854-0071	7	7	TRANSISTOR NPN SI PD=300MA FT=200MHZ	28480	1854-0071
A4Q3	1854-0071	7	7	TRANSISTOR NPN SI PD=300MA FT=200MHZ	28480	1854-0071
A4Q4	1854-0071	7	7	TRANSISTOR NPN SI PD=300MA FT=200MHZ	28480	1854-0071
A4R1	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R2	0698-4002	9	4	RESISTOR 5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5001-F
A4R3	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R4	0698-4002	9	3	RESISTOR 5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5001-F
A4R5	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R6	0698-4002	9	9	RESISTOR 5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5001-F
A4R7	0757-0442	9	5	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R8	0698-3150	6	1	RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A4R9	0698-4002	9	9	RESISTOR 5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5001-F
A4R10	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R11	0698-3160	8	1	RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A4R12	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R13	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R14	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4S1	0490-1186	4	5	RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4S2	0490-1186	4	4	RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4S3	0490-1186	4	4	RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4S4	0490-1186	4	4	RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4S5	0490-1186	4	4	RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490-1186
A4U1	1820-0269	4	2	IC GATE TTL NAND QUAD 2-INP	01295	3N7403N
A4U2	1820-0269	4	4	IC GATE TTL NAND QUAD 2-INP	01295	3N7403N
A4U3	1820-1270	9	1	IC MV TTL L MONOSTBL	01295	3N74L121N

7044B



7045B

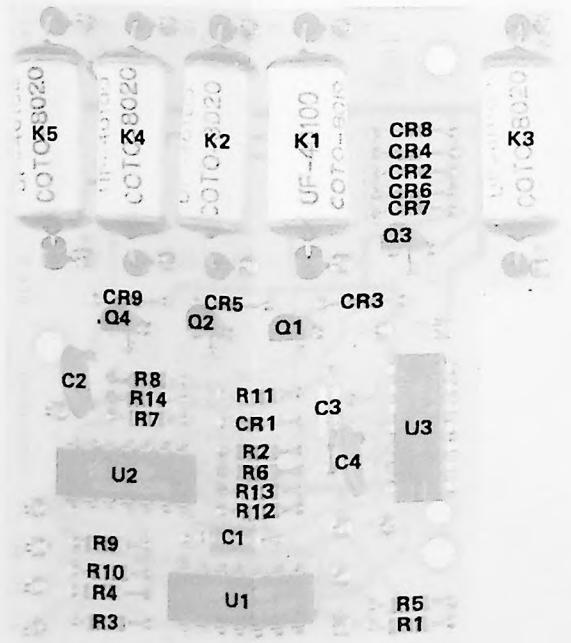


Figure 7-11. TTL Circuit Board

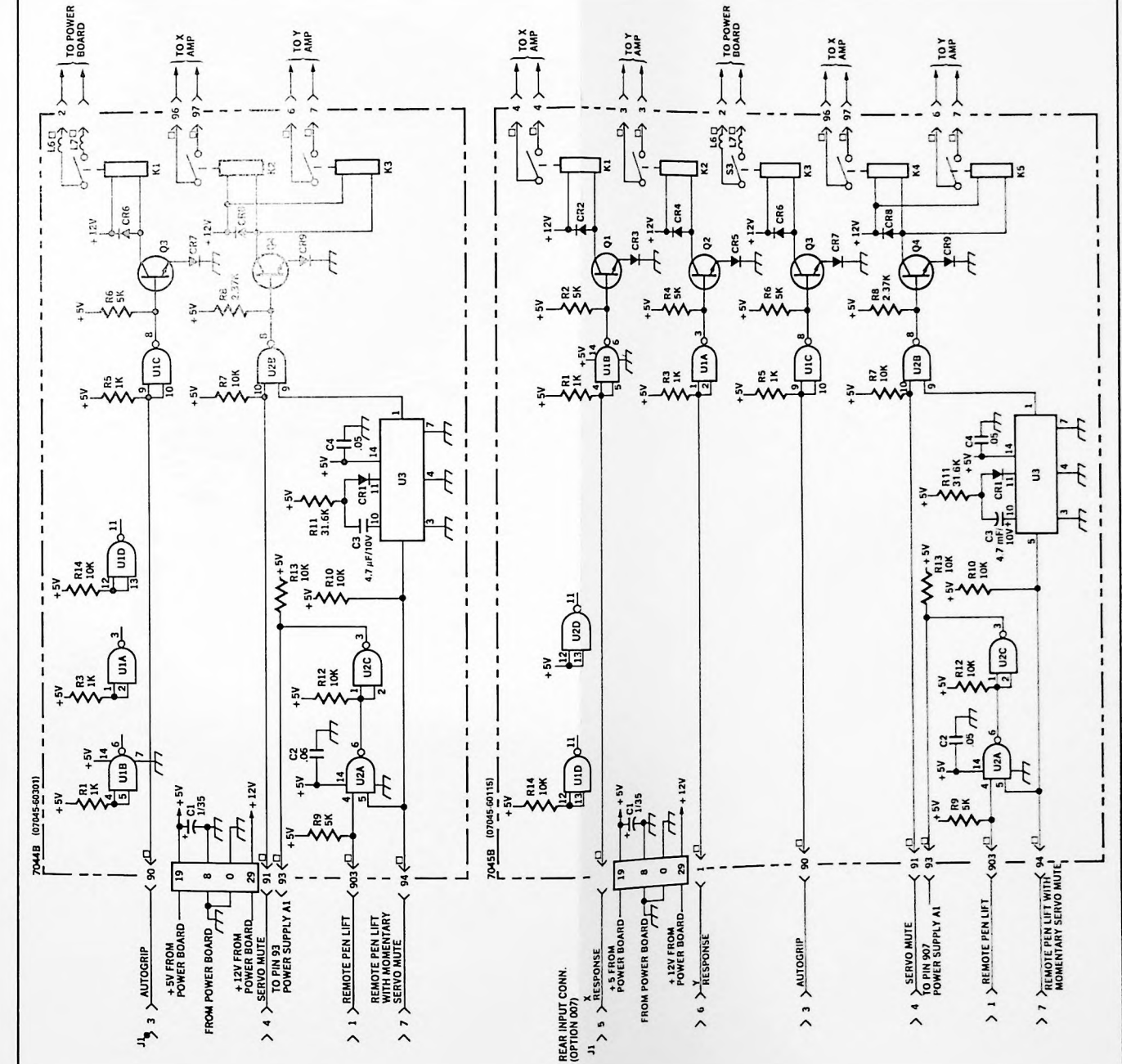


Figure 7-12. TTL Schematic

Table 7-8. Time Base PCA Parts List

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A5	07044=60400	2	1	PCA=TIME BASE (MODEL 7044B)	28480	07044=60400
A5	07045=60070	3	1	PCA=TIME BASE (MODEL 7045B)	28480	07045=60070
A5C1	0160=0174	9	1	CAPACITOR-FXD .47UF +80-20% 25VDC CER	28480	0160=0174
A5C2	0160=3477	1	1	CAPACITOR-FXD 10UF +-10% 50VDC MET-POLYC	84411	X483=1069R5W4
A5C3	0160=2208	4	2	CAPACITOR-FXD 330PF +-5% 300VDC MICA	28480	0160=2208
A5C4	0150=0121	5	1	CAPACITOR-FXD .1UF +80-20% 50VDC CER	28480	0150=0121
A5C5	0180=0291	3	1	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A5C6	0180=1746	5	1	CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A5C7	0180=0374	3	1	CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X9020B2
A5C8	0160=2208	4	1	CAPACITOR-FXD 330PF +-5% 300VDC MICA	28480	0160=2208
A5C9	0180=1743	2	1	CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A5C10	0150=0050	9	1	CAPACITOR-FXD 1000PF +80-20% 1KVDC CER	28480	0150=0050
A5C11	0150=0093	0	2	CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0150=0093
A5C12	0150=0093	0	1	CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0150=0093
A5C13	0180=0039	7	1	CAPACITOR-FXD 100UF+75-10% 12VDC AL	56289	30D107G012CC2
A5CR1	1901=0040	1	7	DIODE-SWITCHING 30V 50MA 2N3 DO-35	28480	1901=0040
A5CR2	1901=0040	1		DIODE-SWITCHING 30V 50MA 2N3 DO-35	28480	1901=0040
A5CR3	1901=0040	1		DIODE-SWITCHING 30V 50MA 2N3 DO-35	28480	1901=0040
A5CR4	1901=0040	1		DIODE-SWITCHING 30V 50MA 2N3 DO-35	28480	1901=0040
A5CR5	1901=0040	1		DIODE-SWITCHING 30V 50MA 2N3 DO-35	28480	1901=0040
A5CR6	1901=0040	1		DIODE-SWITCHING 30V 50MA 2N3 DO-35	28480	1901=0040
A5CR7	1901=0040	1		DIODE-SWITCHING 30V 50MA 2N3 DO-35	28480	1901=0040
A5E1	0340=0060	4	2	TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011=6809 000 209
A5E2	0340=0060	4		TERMINAL-STUD SPCL-FDTHRU PRESS-MTG	98291	011=6809 000 209
A5E3						
A5E20	0360=1514	7	18	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360=1514
A5E21	1251=0600	0	1	CONNECTOR-SGL CONT PIN 1.14=MM-B9C-SZ SQ	28480	1251=0600
A5K1	0490=1186	4	2	RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490=1186
A5K2	0490=1186	4		RELAY-REED 1A 500MA 200VDC 12VDC-COIL	28480	0490=1186
A5Q1	1855=0301	8	1	TRANSISTOR-JFET DUAL 2N5198 N-CHAN	15818	2N5198
A5Q2	1854=0071	7	3	TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854=0071
A5Q3	1854=0071	7		TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854=0071
A5Q4	1854=0071	7		TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854=0071
A5Q5	1853=0020	4	1	TRANSISTOR PNP SI PD=300MHZ FT=150MHZ	28480	1853=0020
A5R1	0698=4424	9	1	RESISTOR 1.4K 1% .125W F TC=0+-100	24546	C4=1/8-T0-1401-F
A5R2	2100=3215	1	1	RESISTOR-TRMR 1K 20% C TOP-ADJ 4-TRN	32997	3339P=1=102
A5R3	0698=3442	9	1	RESISTOR 237 1% .125W F TC=0+-100	24546	C4=1/8-T0-237R-F
A5R4	0698=3158	4	2	RESISTOR 23.7K 1% .125W F TC=0+-100	24546	C4=1/8-T0-2372-F
A5R5	0698=3158	4		RESISTOR 23.7K 1% .125W F TC=0+-100	24546	C4=1/8-T0-2372-F
A5R6	0698=3150	6	4	RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4=1/8-T0-2371-F
A5R7	0698=3449	6	1	RESISTOR 28.7K 1% .125W F TC=0+-100	24546	C4=1/8-T0-2872-F
A5R8	0698=3446	3	1	RESISTOR 383 1% .125W F TC=0+-100	24546	C4=1/8-T0-383R-F
A5R9	0757=0290	5	2	RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0=6191-F
A5R10	0698=3445	2	1	RESISTOR 348 1% .125W F TC=0+-100	24546	C4=1/8-T0-348R-F
A5R11	0698=3441	8	1	RESISTOR 215 1% .125W F TC=0+-100	24546	C4=1/8-T0-215R-F
A5R12	0698=3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4=1/8-T0-2371-F
A5R13	0698=3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4=1/8-T0-2371-F
A5R14	0757=0449	6	1	RESISTOR 20K 1% .125W F TC=0+-100	24546	C4=1/8-T0-2002-F
A5R15	0757=0438	3	2	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4=1/8-T0-5111-F
A5R16	0757=0280	3	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4=1/8-T0-1001-F
A5R17	0757=0200	7	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4=1/8-T0-5621-F
A5R18	0757=0290	5		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0=6191-F
A5R19	0757=0200	7		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4=1/8-T0-5621-F
A5R20	0698=0082	7	1	RESISTOR 464 1% .125W F TC=0+-100	24546	C4=1/8-T0-4640-F
A5R21	0757=0458	7	1	RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4=1/8-T0-5112-F
A5R22	0698=3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4=1/8-T0-2371-F
A5R23	0757=0428	1	1	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4=1/8-T0-1621-F
A5R24	0698=3458	7	1	RESISTOR 348K 1% .125W F TC=0+-100	28480	0698=3458
A5R24	0698=3260	9	1	(MODEL 7044B ONLY) RESISTOR 464K 1% .125W F TC=0+-100 (MODEL 7045B ONLY)	28480	0698=3260
A5R25	0757=0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4=1/8-T0-5111-F
A5R26	2100=1986	9	1	RESISTOR-TRMR 1K 10% C TOP-ADJ 1-TRN	73138	82PR1K
A5U1	1820=0328	6	1	IC GATE TTL NOR QUAD 2-INP	01295	S17402N
A5U2	1820=0054	5	1	IC GATE TTL NAND QUAD 2-INP	01295	S17400N
A5U3	1826=0059	2	1	IC OP AMP GP T0-99 PKG	01295	LM201AL
A5VR1	1902=0786	4	1	DIODE-ZNR 1N937 9V 5% DO-7 PD=.5W	24046	17937
A5VR2	1902=3139	7	1	DIODE-ZNR 8.25V 5% DO-35 PD=.4W	28480	1902=3139
A5VR3	1902=0048	1	1	DIODE-ZNR 6.81V 5% DO-35 PD=.4W (MODEL 7044B ONLY)	28480	1902=0048
A5VR3	1902=3070	5	1	DIODE-ZNR 4.22V 5% DO-35 PD=.4W (MODEL 7045B ONLY)	28480	1902=3070
A5W1	8151=0013	4	1	WIRE 22AWG 1X22	28480	8151=0013

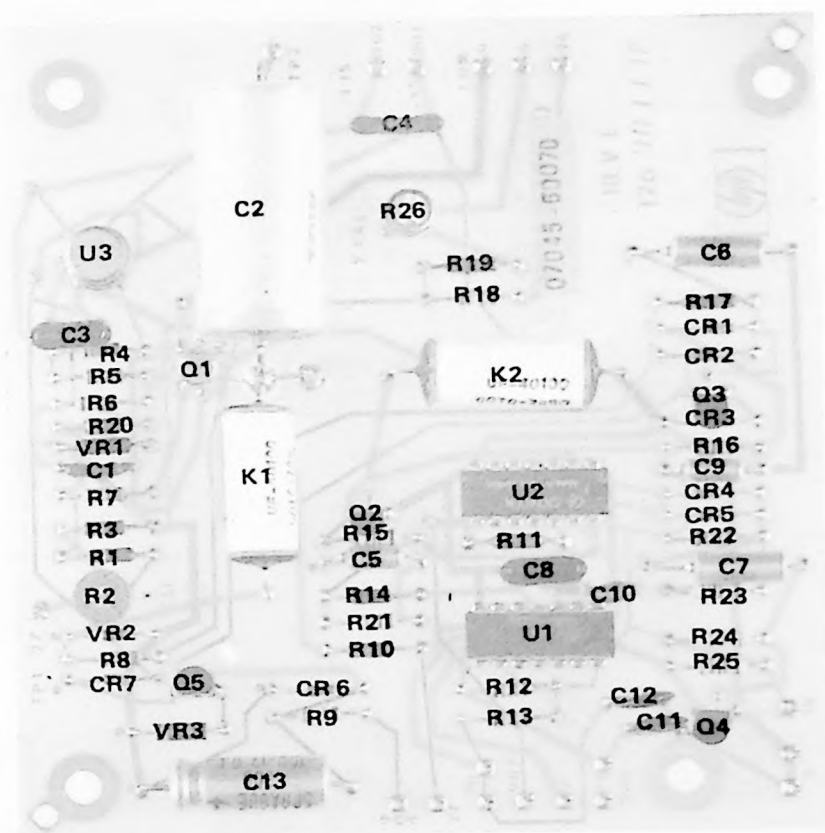


Figure 7-13. Time Base Circuit Board – Option 001

Figure 7-14. Time Base Schematic

Table 7-9. Schematic Diagram Symbols (Sheet 1 of 2)

SCHEMATIC DIAGRAM NOTES

Resistance in ohms, capacitance in microfarads, inductance in millihenries unless otherwise noted.

*

Asterisk denotes a factory-selected value. Value shown is typical. Part might be omitted.



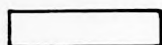
Indicates a NOTE on the schematic diagram.



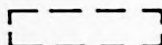
Tool-aided adjustment.



Manual control.



Encloses a front-panel or circuit assembly silkscreened designator.



Encloses a rear-panel silkscreened designator.



Circuit assembly borderline.



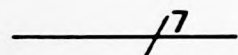
Other assembly borderline. Also used to indicate mechanical interconnection (ganging) and RF shielding.



Heavy line with arrows indicates path and direction of main signal.



Heavy dashed line with arrows indicates path and direction of main feedback.



Indicates cable run with seven lines.



Wiper moves toward CW with clockwise rotation of control (as viewed from shaft or knob).



Numbered Test point. Measurement aid (metal post, circuit pad, etc.) provided.



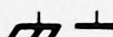
Lettered Test point. No measurement aid provided.



Encloses wire color code. Code used is the same as the resistor color code. First number identifies the base color, second number identifies the wider stripe, third number identifies the narrower stripe (e.g., (947) denotes white base, yellow wide stripe, violet narrow stripe).



A direct conducting connection to the earth, or a conducting connection to a structure that has a similar function (e.g., the frame of an air, sea, or land vehicle).



A conducting connection to a chassis or frame.



Common connections. All like-designated points are connected. When accompanied by a letter, indicates the type common (i.e., A = Analog, D = Digital, F = Floating).

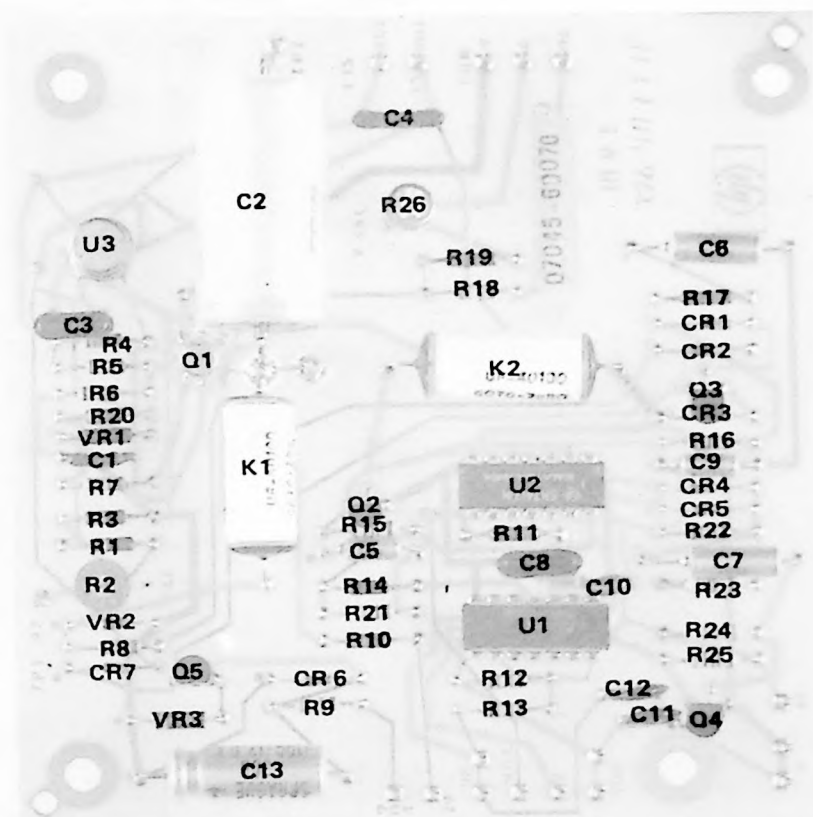


Figure 7-13. Time Base Circuit Board — Option 001

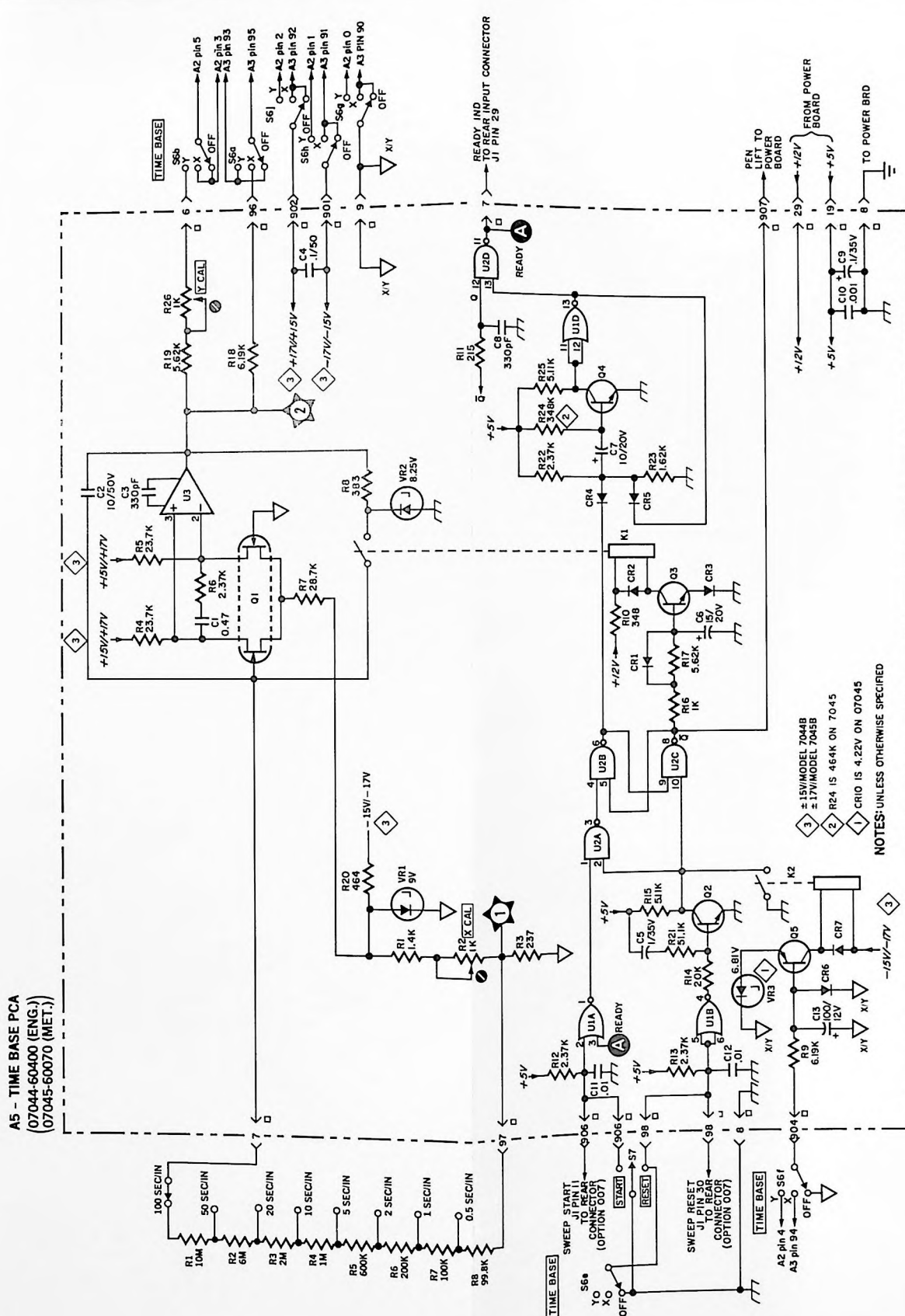


Figure 7-14. Time Base Schematic

Table 7-9. Schematic Diagram Symbols (Sheet 1 of 2)

SCHEMATIC DIAGRAM NOTES

Resistance in ohms, capacitance in microfarads, inductance in millihenries unless otherwise noted.

*

Asterisk denotes a factory-selected value. Value shown is typical. Part might be omitted.



Indicates a NOTE on the schematic diagram.



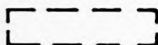
Tool-aided adjustment.



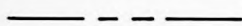
Manual control.



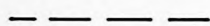
Encloses a front-panel or circuit assembly silkscreened designator.



Encloses a rear-panel silkscreened designator.



Circuit assembly borderline.



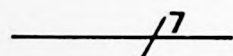
Other assembly borderline. Also used to indicate mechanical interconnection (ganging) and RF shielding.



Heavy line with arrows indicates path and direction of main signal.



Heavy dashed line with arrows indicates path and direction of main feedback.



Indicates cable run with seven lines.



Wiper moves toward CW with clockwise rotation of control (as viewed from shaft or knob).



Numbered Test point. Measurement aid (metal post, circuit pad, etc.) provided.



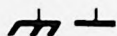
Lettered Test point. No measurement aid provided.



Encloses wire color code. Code used is the same as the resistor color code. First number identifies the base color, second number identifies the wider stripe, third number identifies the narrower stripe (e.g., (947) denotes white base, yellow wide stripe, violet narrow stripe).



A direct conducting connection to the earth, or a conducting connection to a structure that has a similar function (e.g., the frame of an air, sea, or land vehicle).



A conducting connection to a chassis or frame.



Common connections. All like-designated points are connected. When accompanied by a letter, indicates the type common (i.e., A = Analog, D = Digital, F = Floating).

Table 7-9. Schematic Diagram Symbols (Sheet 2 of 2)



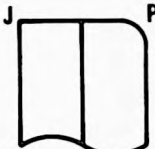
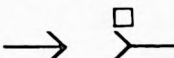
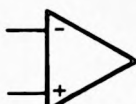



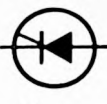

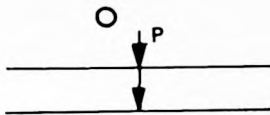



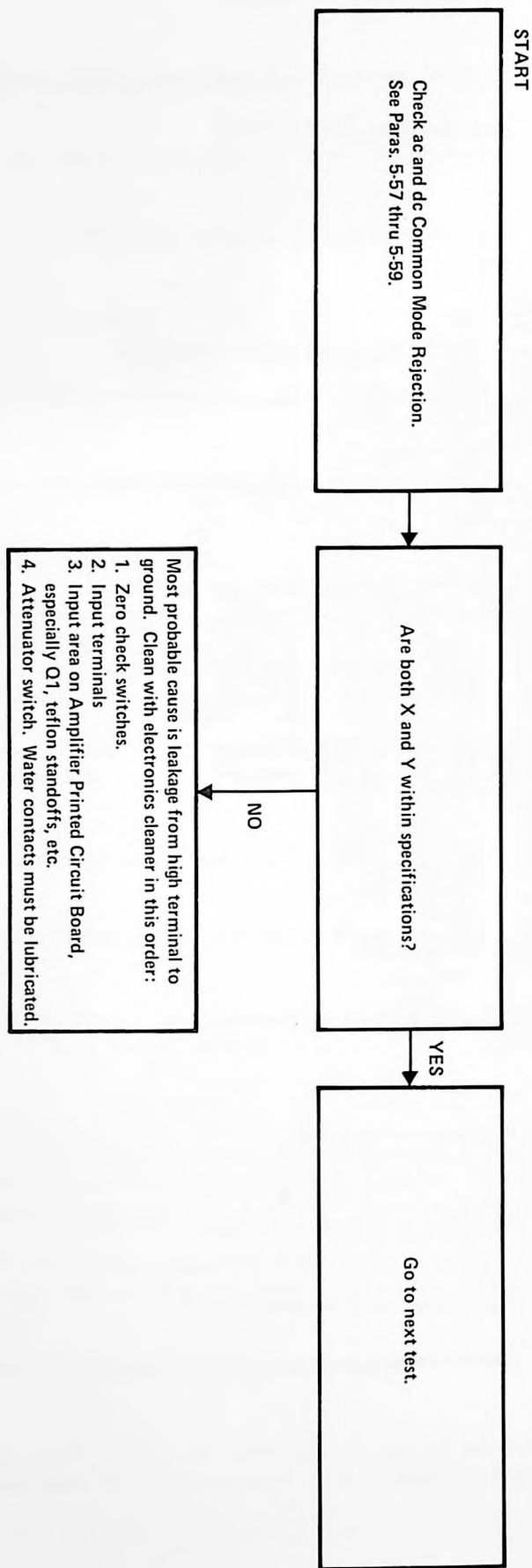
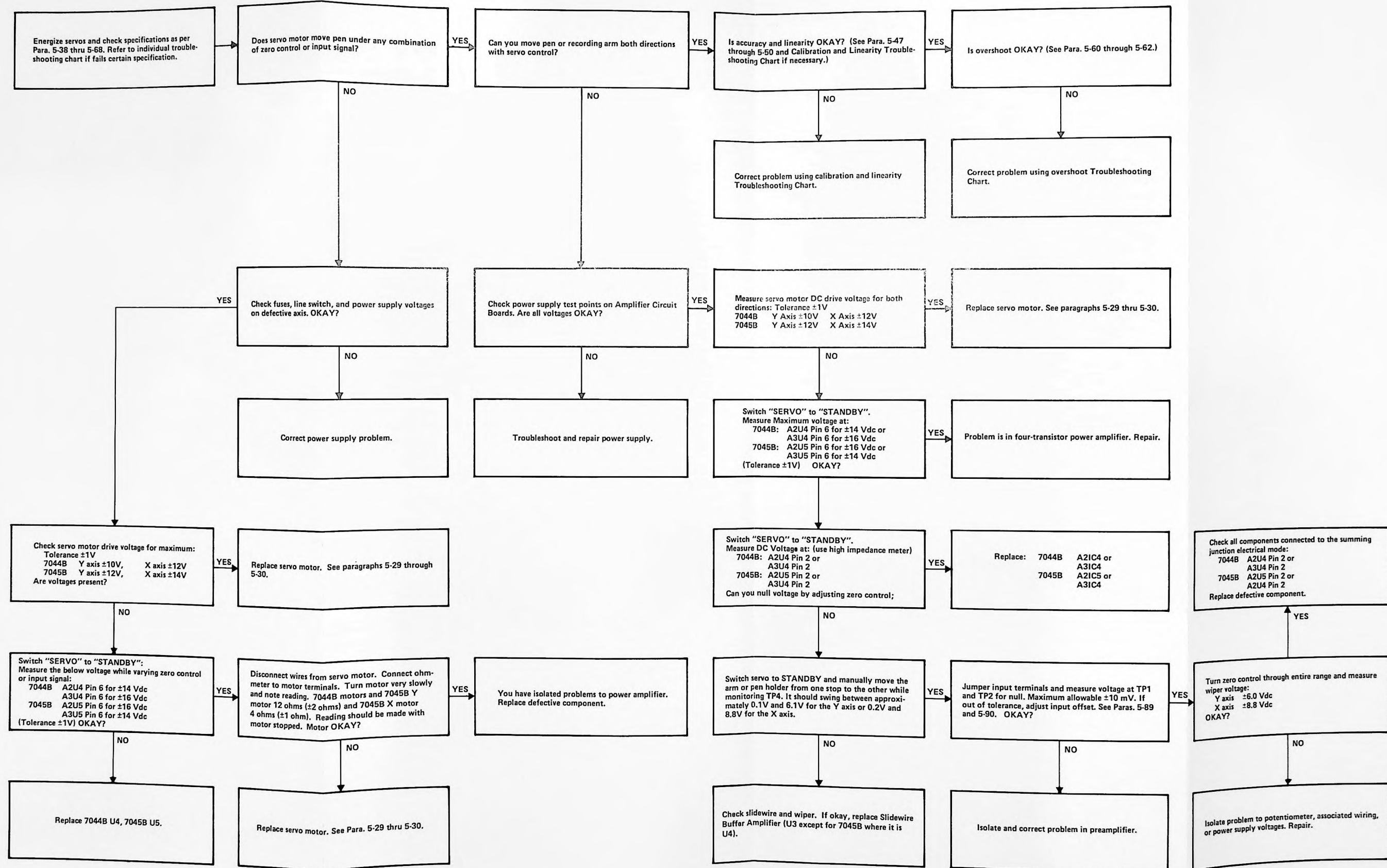
SCHEMATIC DIAGRAM NOTES (Continued)	
	Light Emitting Diode (LED).
	Photo-Transistor.
	Cable and circuit assembly connectors.
	Circuit assembly square-pin connectors.
	Operational Amplifier (integrated circuit).
	Voltage regulator (breakdown diode).
	Denotes Field Effect transistor (FET) with N-type base.
	Denotes FET with P-type base.
	Denotes Silicon Controlled Rectifier (SCR).
	Denotes spring-loaded switch.
	Indicates twisted pair.
	Identifies service sheet for quick reference.
	Signal line identification.
	Combined service sheet and signal line identification.

Table 7-10. AC/DC Common Mode Rejection Troubleshooting Chart



Model 7044B/7045B

Table 7-11. Servo System Troubleshooting Chart



Model 7044B/7045B

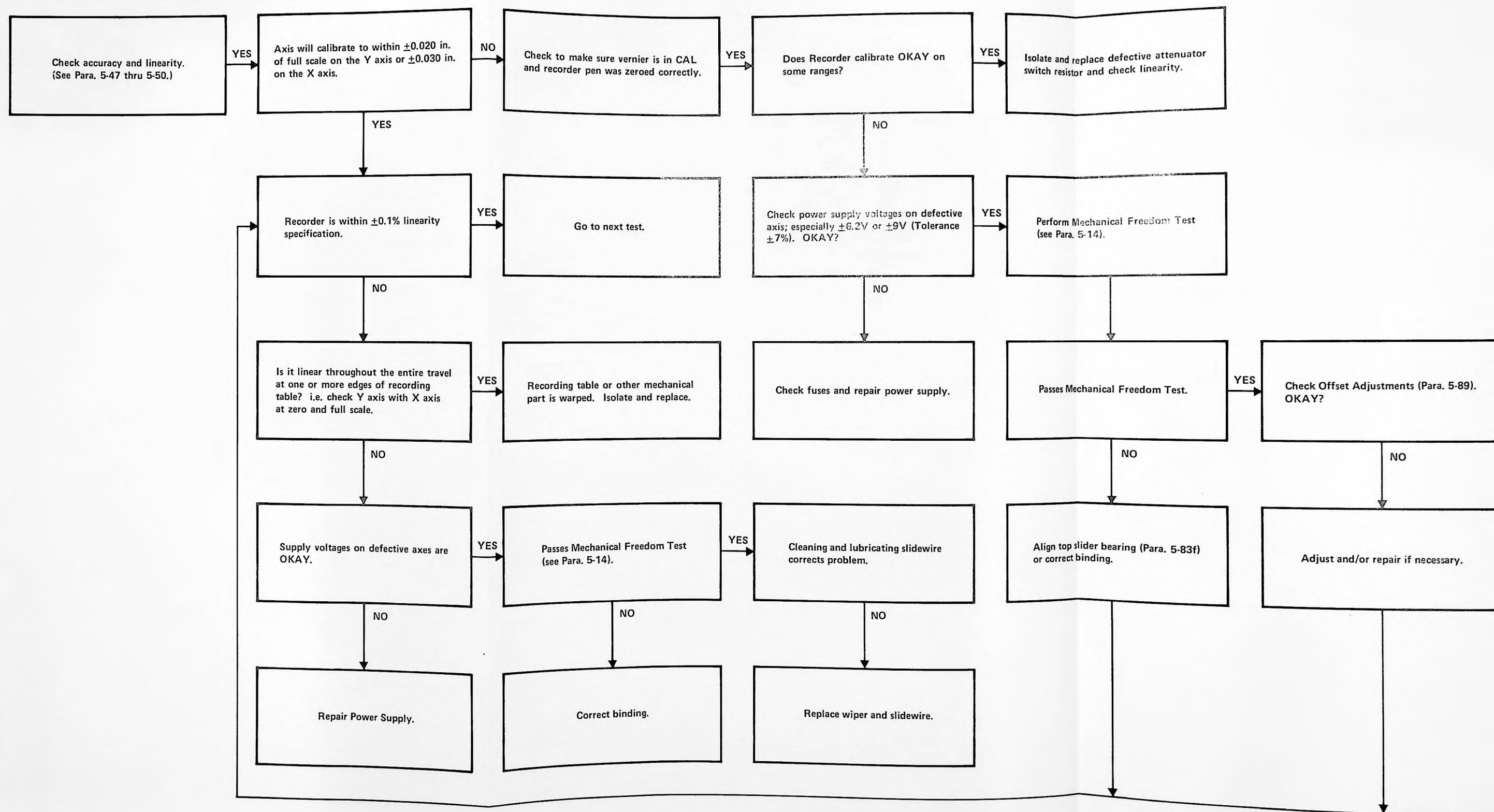
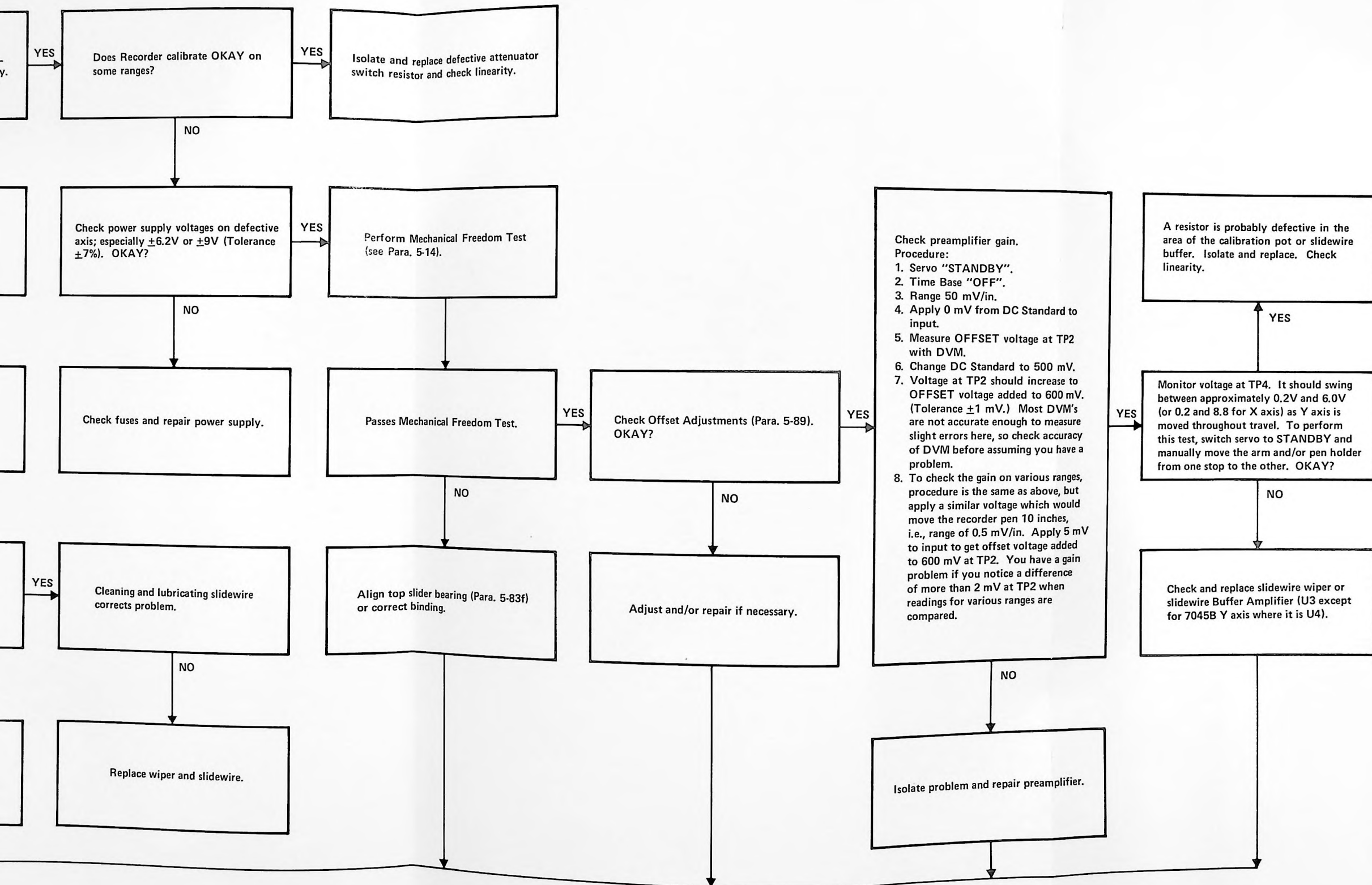


Table 7-12. Calibration and Linearity Troubleshooting Chart



Model 7044B/7045B

Table 7-13. Input Resistance Troubleshooting Chart

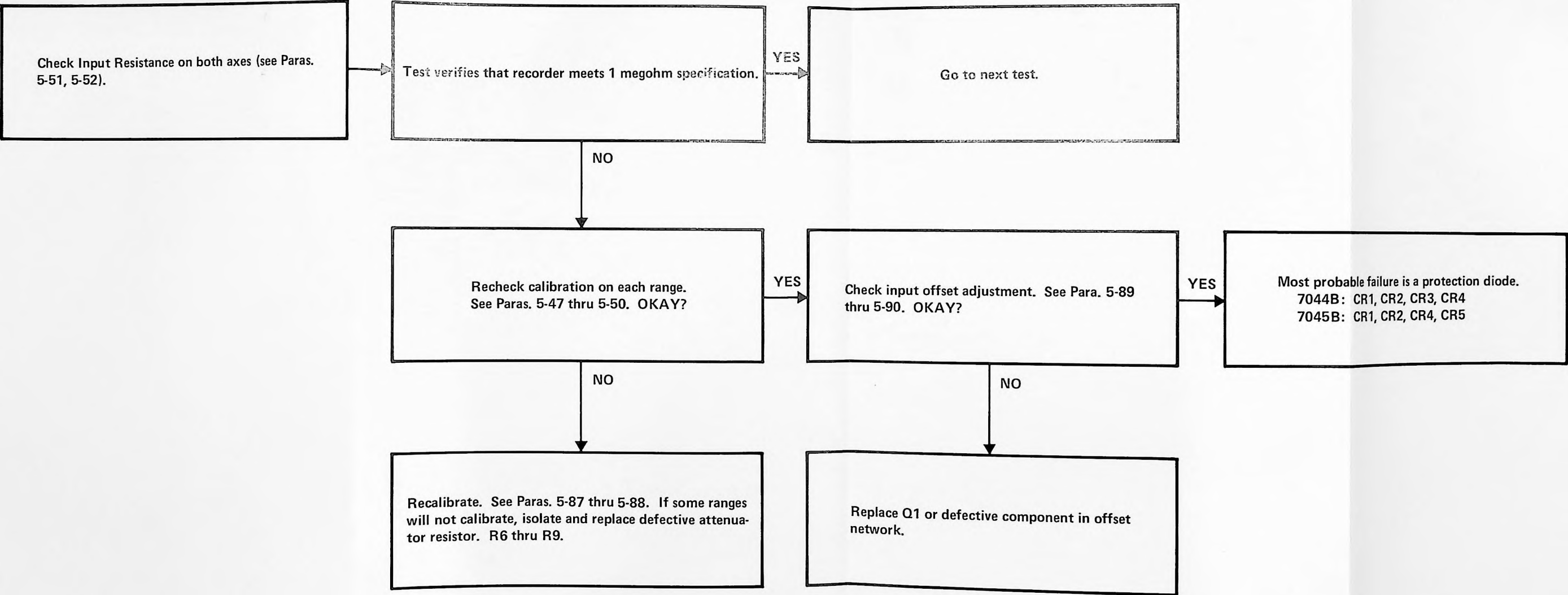


Table 7-14. Slewing Speed Troubleshooting Chart

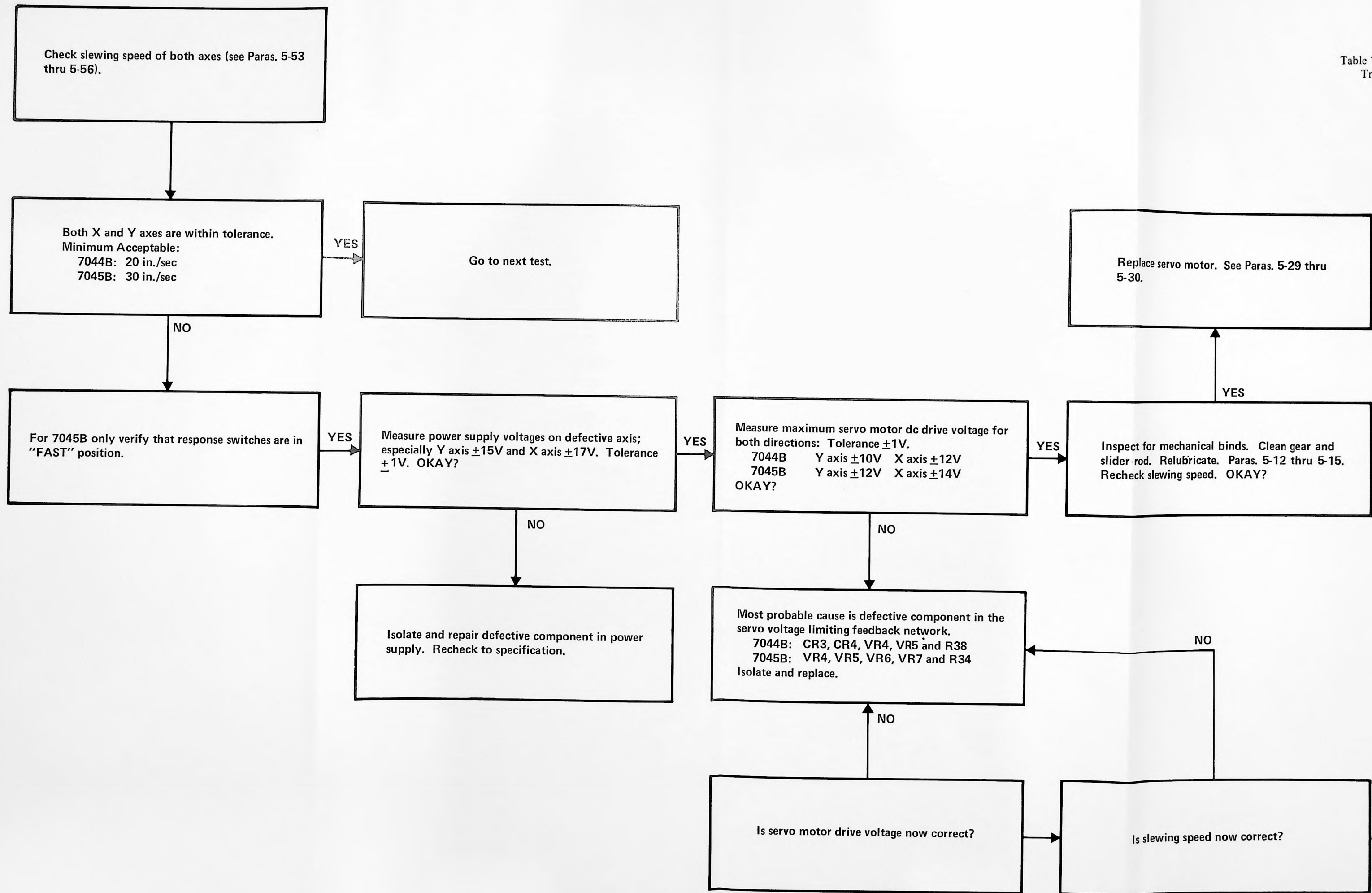
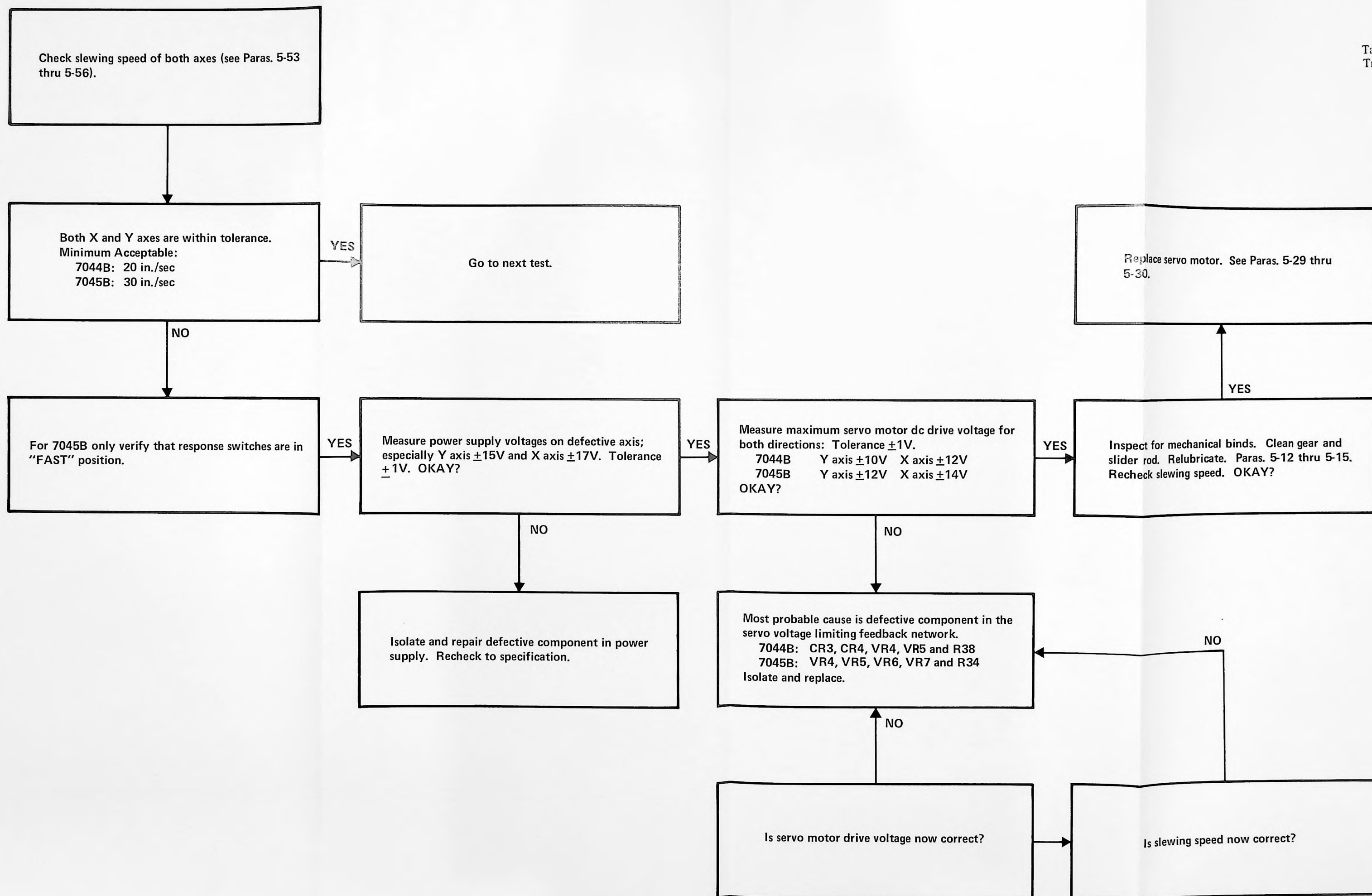


Table 7-15. Overshoot
Troubleshooting Chart



MANUAL CHANGES

MANUAL TITLE: 7044B/7045B X-Y Recorder
Operating & Service Manual
MANUAL PRINTED: November 1980

MANUAL PART NO. 07044-90006
CHANGE DATE: March 9, 1983

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual. To use this supplement:

Make all **ERRATA** corrections.

Make all appropriate serial number related changes indicated in the tables below.

▲ Indicates new item.

SERIAL PREFIX	MAKE CHANGE	SERIAL PREFIX	MAKE CHANGE	SERIAL PREFIX	MAKE CHANGE
2129	1				

ERRATA

Page 1-1, paragraph 1-5, first sentence. Change "contens" to "contents."

Page 1-2, Table 1-1. Following "Type of Input", change first sentence to read as follows:

Floating 200 Vdc or peak ac maximum.

In graph showing Typical Performance Limits, change 7045A and 7044A to 7045B, 7044B respectively.

Page 3-1, paragraph 3-8. Replace last sentence with the following:

Refer to Figure 3-3 for line fuse ratings.

Page 3-5, Figure 3-4. Replace with attached Figure 3-4. Rear Connector.

Page 5-1. Delete first two sentences of paragraph 5-7.

Page 5-1, paragraph 5-9, change to read as follows:

The area of operation should be as free as possible of air contamination (soot, smoke, fumes, etc.). Frequent cleaning of the recorders will be required if they are exposed to excessive air contamination. In areas of high humidity, graph paper may expand, effecting the accuracy of the grid lines.

Page 5-3, Figure 5-2A. Change 7044A to 7044B. Figure 5-2B. Change 7045A to 7045B.

Page 5-7, Figure 5-10. Replace with attached figure.

Page 5-13, paragraph 5-61.f. Change 7044A and 7045A to 7044B, 7045B respectively.

Page 5-14, paragraph 5-68. Replace steps c. through f. with the following:

- c. Place SERVO toggle switch to ON (servo motors will drive pen to null).
- d. Make connection between Pin 4 and Pin 20 (ground) of J1 (rear input connector) to mute servos. Servos should not respond to ZERO controls.
- e. Connect jumper between Pin 3 and Pin 20 (ground) of J1 (rear input connector). Place CHART toggle switch to HOLD. Place recording paper onto recording table. It should be easy to move paper in any direction.
- f. Remove jumper between Pin 3 and Pin 20. Chart paper should now be held firmly in place.

Page 6-2, Item 31 to read:

0403-0303 8 4 Foot-rubber

Page 6-4, Table 6-1 (Sheet 2). Add the following:

23 (not shown)	1251-3122	7	37	Contact-Connector	28480	1251-3122
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Page 6-7, Table 6-1 (Sheet 4). Change Item 69 to:

0510-0005	8	2	Retainer C-Ring	28480	0510-0005
-----------	---	---	-----------------	-------	-----------

Page 6-8, Table 6-2. Change part number of item 23 to: 07046-60910.

Page 6-8, Table 6-2. Make the following changes:

Add "(Cable attached)" to description of item 29.

Add item 29A as follows:

29A	3101-2269	6	1	Line Switch (Less Cable)	28480	3101-2269
-----	-----------	---	---	--------------------------	-------	-----------

Page 6-10, Table 6-3, Attenuator Assembly. Change R13 to read R12.

Page 6-13, Table 6-5, Item 29 to read: 0403-0303.

Page 6-14, Table 6-5 (Sheet 2). Add the following:

23 (not shown)	1251-3122	7	37	Contact-Connector	28480	1251-3122
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Page 6-16, Table 6-5 (Sheet 3). Change items 45 and 55 to read:

45	07040-60370	1	1	Pulley Assembly, Y-Axis	28480	07040-60370
55	07045-00905	1		Rear Hood Assembly (English)	28480	07045-00905
	07045-00906			Rear Hood Assembly (Metric)	28480	07045-00906

Page 6-17, Table 6-5 (Sheet 4). Change items 69 and 103:

69	0510-0005	8	2	Retainer C-Ring	28480	0510-0005
103	1853-0252	4	1	Transistor	28480	1853-0252

Page 6-18, Table 6-6. Make the following changes:

Add "(Cable attached)" to description of item 29.

Add item 29A as follows:

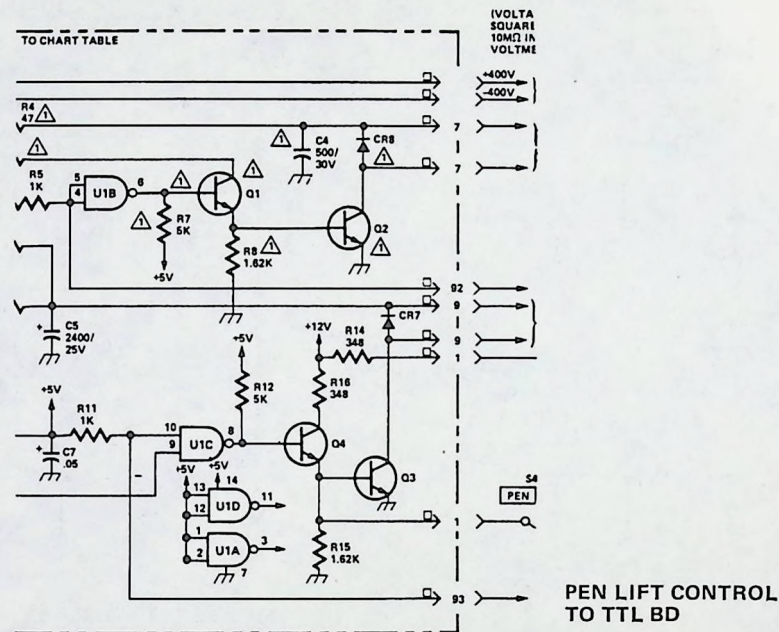
29A	3101-2269	6	1	Line Switch (Less Cable)	28480	3101-2269
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Page 6-20, Table 6-7, Attenuator Assembly. Change R13 to read R12 and change part number to 2100-3978.

Page 7-3, Figure 7-2. At pin 93, change the text to read:

PEN LIFT CONTROL
TO TTL PCA

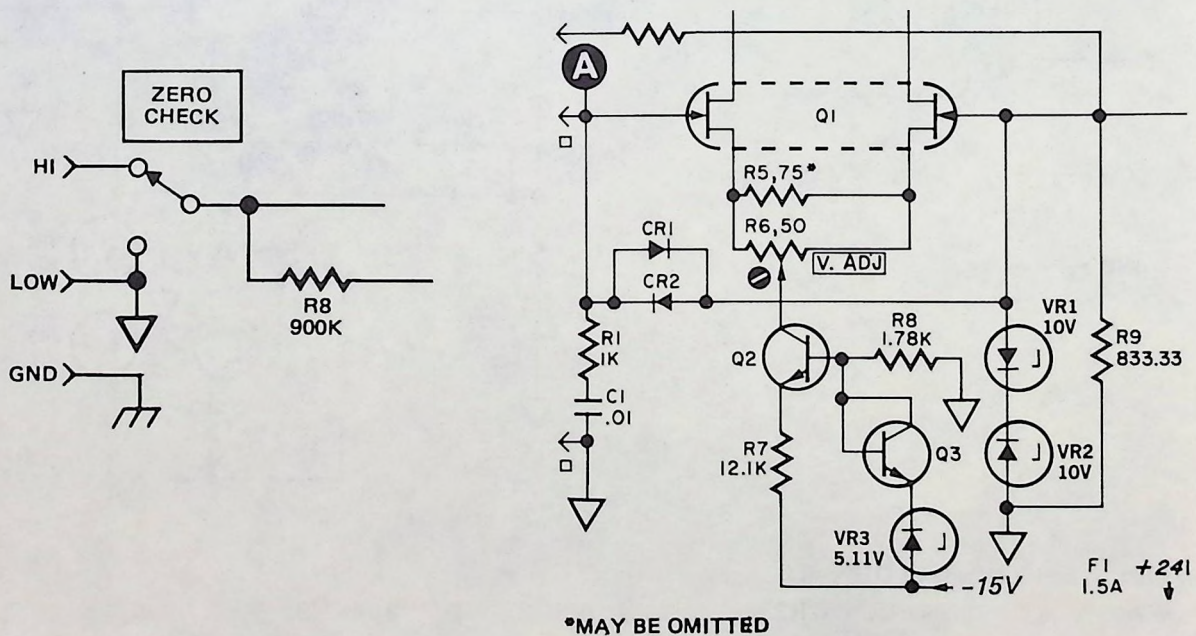
Change IC U1 as indicated below.



Page 7-4, Table 7-2. Change item A2Q1 to:

A2Q1	1855-0376	7	1	Transistor-JFET Dual-Chan D-Mode SI	28480	1855-0376
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Page 7-5, Figure 7-4. Change portions of schematic as follows:

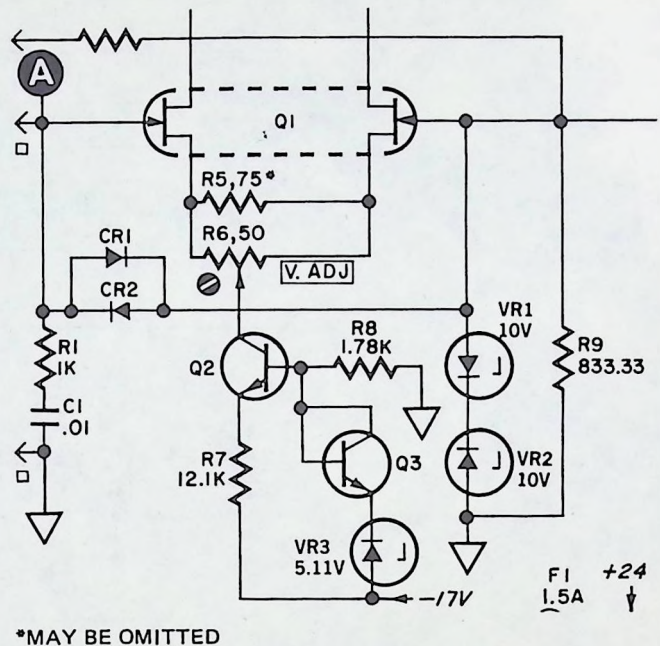
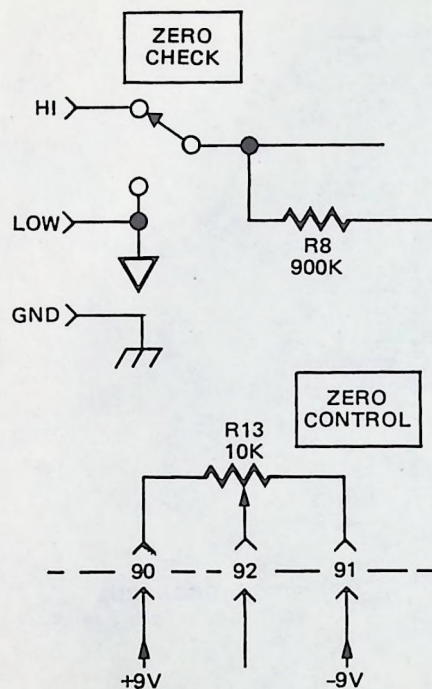


Page 7-6, Table 7-3. Change item A3Q1 to:

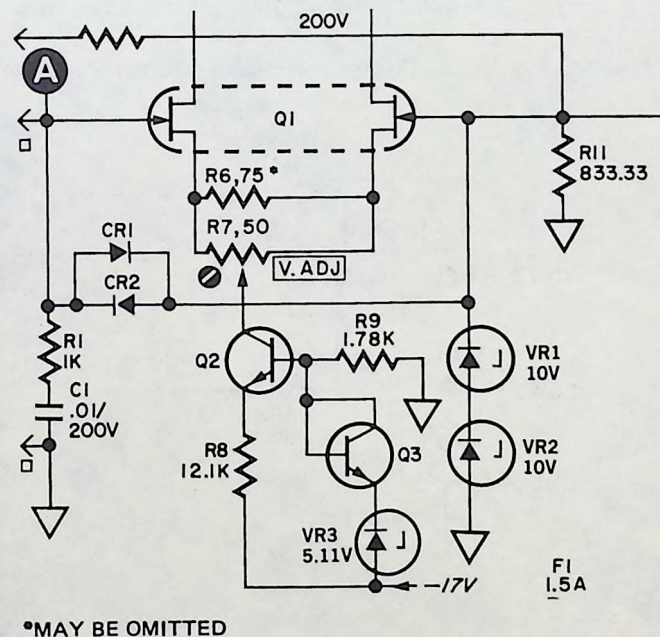
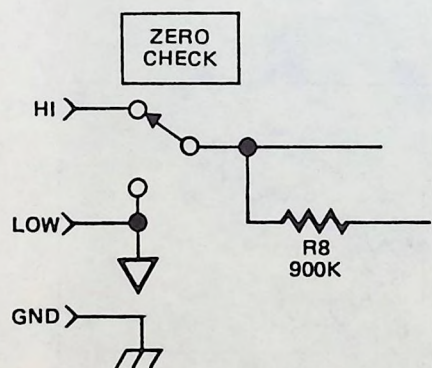
A3Q1 1855-0376 7 1 Transistor-JFET Dual-Chan D-Mode SI 28480 1855-0376

▲ Page 7-7, Table 7-3, item A3R22. Change description for P/N 0698-7322 from (ENGLISH) to (METRIC)
for P/N 0698-5556 from (METRIC) to (ENGLISH).

Page 7-7, Figure 7-6. Change portions of schematic as follows:



Page 7-9, Figure 7-8. Change portions of schematic as follows:



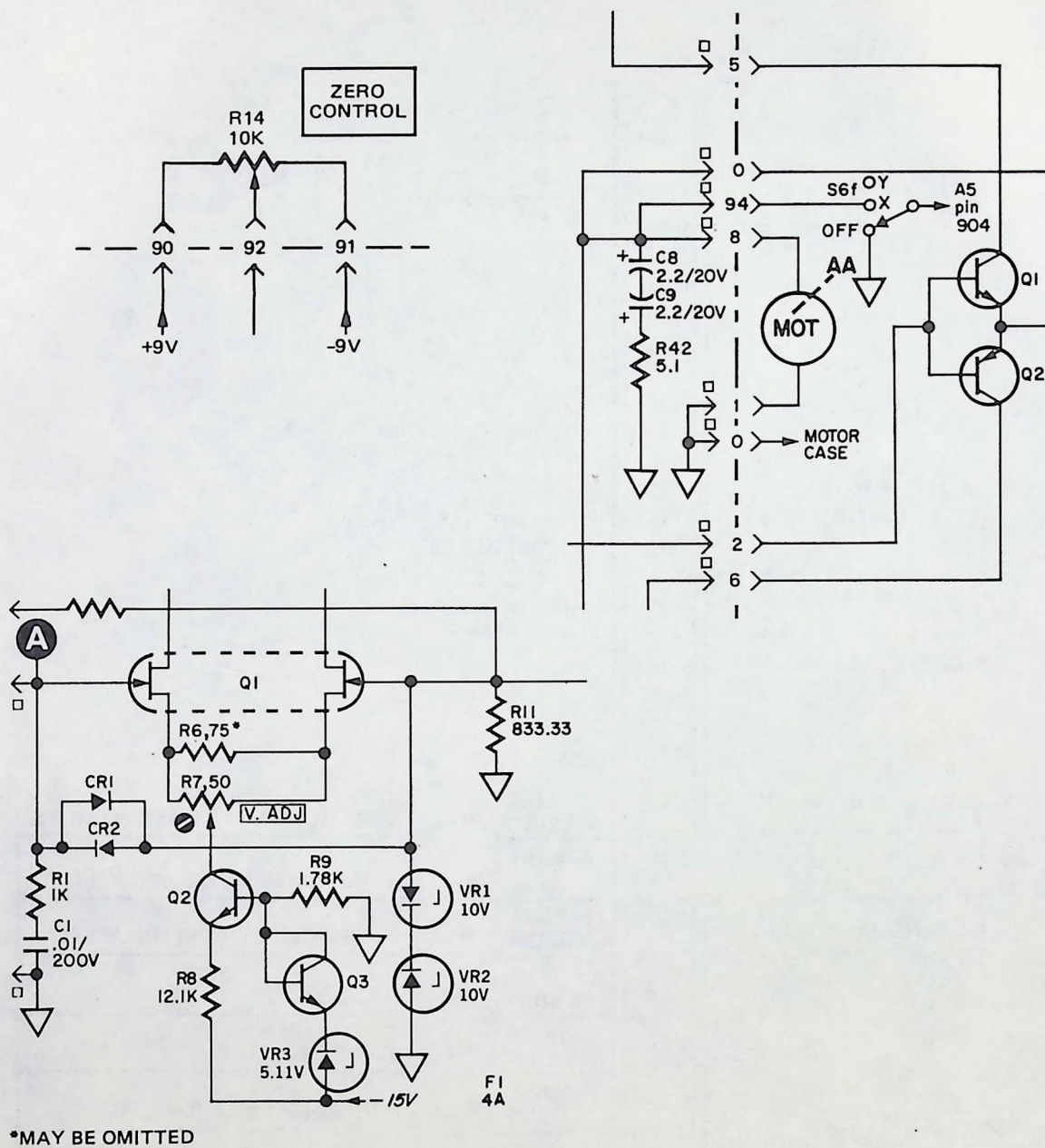
Delete L1 and L2 at base of Q10 and Q11 respectively.

▲ Page 7-9, Table 7-4. Change item A2R33 to:

A2R33

2100-2497

Page 7-11, Figure 7-10. Change portions of schematic as follows:

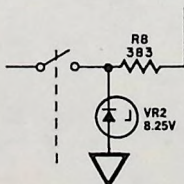


Page 7-13, Table 7-7. Change A4S1 through A4S5 to A4K1 through A4K5 respectively.

Page 7-15, Figure 7-14. Change portion of schematic as follows:

Change Note 1 to read:

1 VR3 is 4.22V on 7045



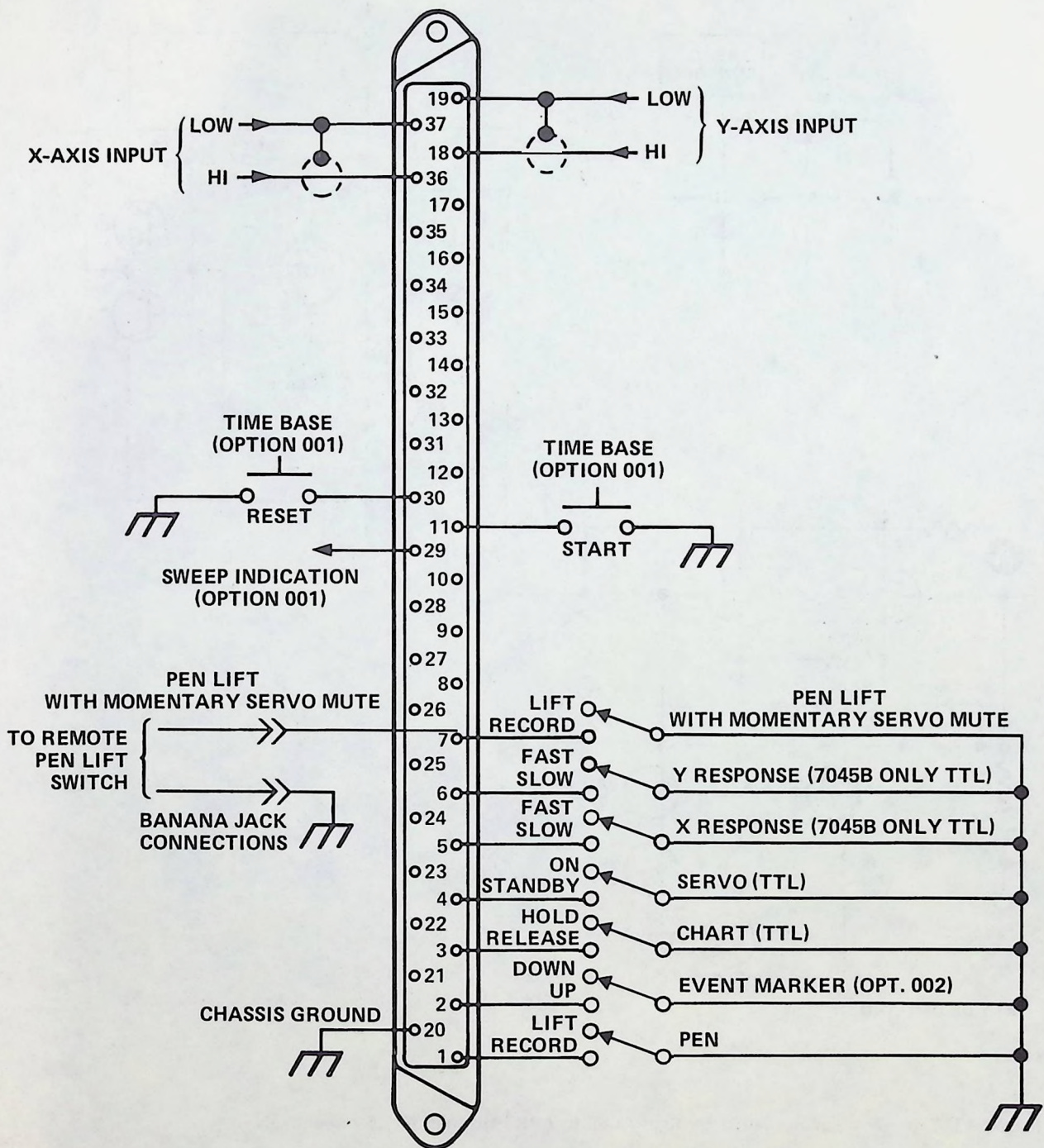


Figure 3-4. Rear Connector.

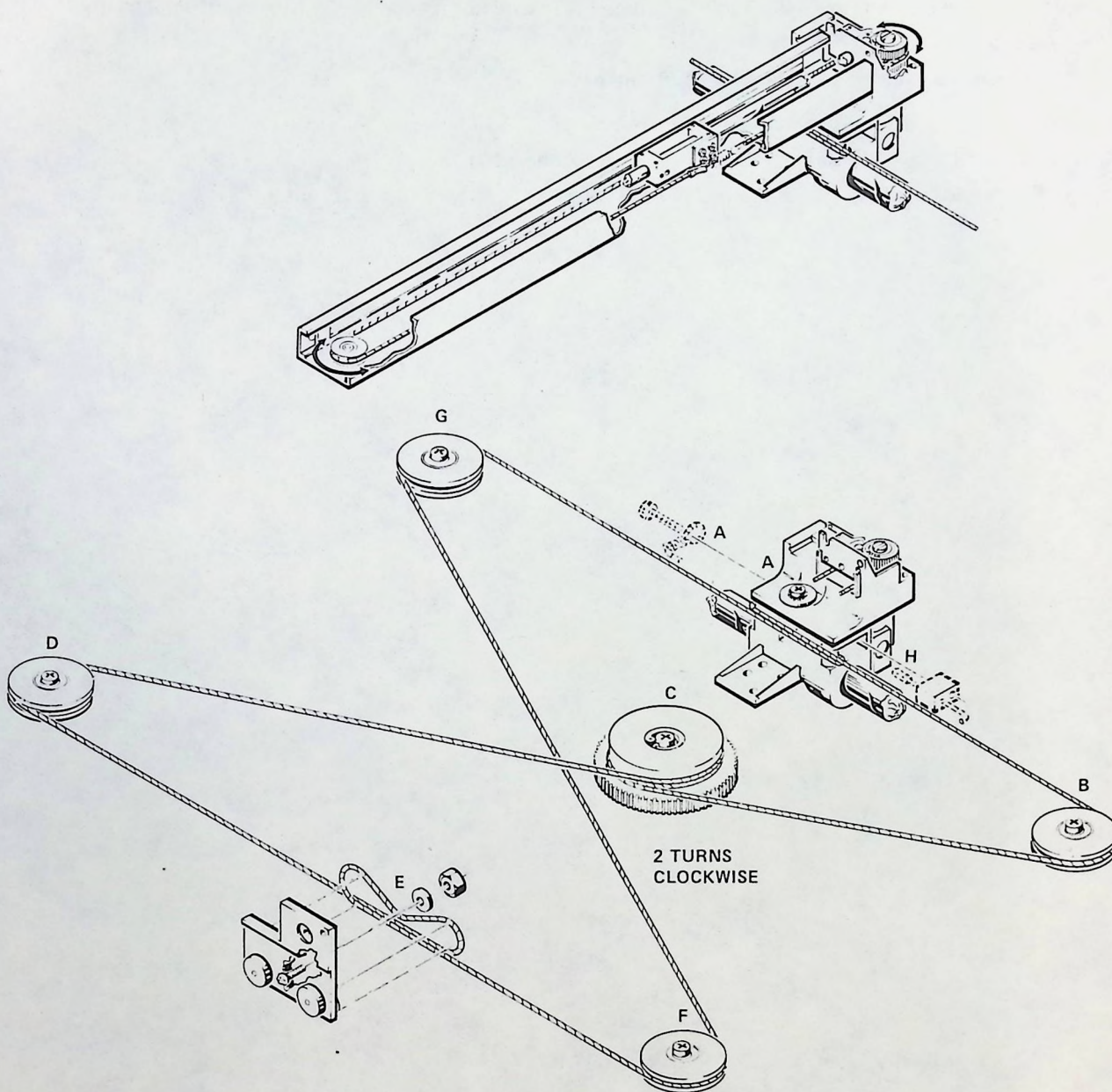


Figure 5-10. X and Y-Axis Restringing, 7044B Model

CHANGE 1

This change introduces new X and Y attenuator assemblies which are directly interchangeable with existing attenuator assemblies.

For component level replacement note that the new Vernier potentiometer (R12) cannot be installed on the older attenuator assembly; however, the old potentiometer can be installed on the new assembly.

Page 6-10, Table 6-3 and Page 6-20, Table 6-7. X and Y Attenuator Assembly Part Number 07046-60910:

Add to P/N 2100-3917 (R12):

"For recorders having a serial prefix 2128 and lower."

Add new attenuator assembly Vernier potentiometer:

2100-3978 R12 R:VAR 5k ohms 10T

"For recorders having a serial prefix 2129 and above."